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DOMESTIC URANIUM MINING INDUSTRY AND THE DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT PROGRAM

HEARINGS

BEFORE THE

SUBCOMMITTEE ON
ENERGY RESEARCH AND DEVELOPMENT

OF THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDREDTH CONGRESS

FIRST SESSION

ON THE

CURRENT STATUS OF THE DOMESTIC URANIUM INDUSTRY AND THE DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT PROGRAM

MARCH 9 AND 13, 1987

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DOMESTIC URANIUM MINING INDUSTRY AND THE DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT PROGRAM

MONDAY, MARCH 9, 1987

U.S. Senate,
Subcommittee on Energy Research and Development,
Committee on Energy and Natural Resources,
Washington, DC.

The subcommittee met, pursuant to notice, at 2:02 p.m., in room SD-366, Dirksen Senate Office Building, Hon. Wendell H. Ford, presiding.

OPENING STATEMENT OF HON. WENDELL H. FORD, A U.S. SENATOR FROM THE STATE OF KENTUCKY

Senator **Ford**. Today the Subcommittee on Energy Research and Development begins hearings on the viability of the uranium mining industry and on the future management of the Department of Energy's Uranium Enrichment Enterprise.

Today's hearing is the first of a series that will concentrate the attention of this committee on the whole spectrum of the uranium industry: enrichment, sales, use, and waste management.

We intend to do a complete job. We intend to move legislation.

Billions of dollars in revenues and thousands of jobs that could provide productive work for our people are at stake here. Yet neglect, and in some cases, plain mischief have taken their toll on these activities in which we, the United States, once held a preeminent position in the world.

We very much need to focus the attention of Congress on these problems, give direction and give leadership.

In these hearings, we will collect the background information on which to base our legislation. We will take up the issues that affect the Department of Energy's Uranium Enrichment Program on Friday, March 13, in this hearing room. I only hope the fact that we are starting our work on Friday the 13th will not be an omen.

Today we are concentrating on the issues of uranium mining, our dependence now and in the future on imported uranium ore, the importance to our national security of a viable domestic uranium industry and the cost of cleaning up the uranium mill tailings piles at existing uranium mill sites.

If we decide that maintenance of a viable domestic uranium mining and milling industry is important, we may need to act to achieve that result.

Previous congresses and presidents evidently considered the industry important enough to support the provisions that are now in the Atomic Energy Act to protect the industry's viability. Now the Administration is in court with the miners and producers of uranium on what these provisions require the Administration to do.

How that litigation is settled will affect what we do in any legislation.

For purposes of this hearing, however, I propose that we not refight the issues that are in court. Rather, we should decide what we think about this industry and its importance to the Nation, independent of what the Atomic Energy Act says.

A court will decide about the Atomic Energy Act language question soon enough. We need to know where we, in the 100th Congress are, on the more fundamental issue of what kind of uranium industry this Nation needs.

We are pleased today to have the Administrator of the Energy Information Administration, Mr. Merklein, and the Assistant Secretary of Energy, David Rossin, here, and their assistants I understand are with them. And so, Mr. Merklein, we will start with you and will go from there.

But, excuse me for just a moment. Senator Domenici is here.

Pete, do you have any kind of opening statement that you would like to give?

Senator DOMENICI. I think what I will do is just hold for a little bit. I do have an opening statement, but let's get started.

Senator Ford. Well, now, it is up to you, my friend. Do whatever you want.

Senator DOMENICI. Very well.

STATEMENT OF HON. PETE V. DOMENICI, A U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator DOMENICI. Thank you, Mr. Chairman. I will try here to be brief.

First, I thank you for holding the hearings. It goes without saying that these are matters of extreme interest to my State. Obviously they are national, but New Mexico has a very important and significant part in the hearings.

The hearings focus on uranium producers, mill tailings cleanup, and I see little change in the state of affairs that we found ourselves in last year at about the same time. We held hearings then, as you will recall, Mr. Chairman, on Senate Bill 1004. If anything, things might be a bit worse in the uranium mining industry. Based on data compiled by the Energy Information Administration, the Secretary of Energy declared the industry to be nonviable for 1985. For the second year in a row, uranium production declined in 1985 to an alltime low, of 11.3 million pounds of U3O8, which is only about one-fourth the level measured during the record year of 1980.

Employment in 1985, likewise, was found to be at an all-time low of 2,400 people in the entire industry, an 82 percent drop since 1981.

It is clear to me that, under section 161v. of the Atomic Energy Act, the Secretary is empowered to restrict the enrichment of foreign uranium in order to assure the viability of our uranium industry. The Administration continues to maintain an unbending posture. They refuse to invoke any limitations, regardless of whether this is in the law or not.

Maybe the decision in the Denver court will shed more light on this subject.

The Administration continues to shy away from actions that could be taken under 170B of the act. In fact, they refuse even to take a look into whether or not Canadian prices and policies skew the market to our distinct disadvantage.

Meanwhile, almost coincidentally, along about 1983, at the very time the industry began its nose-dive, the Environmental Protection Agency finally came out with regulations on reclamation of Title II uranium mill tailing sites.

Speaking as one who cares as much about the responsible protection and rehabilitation of the environment, I wonder how, as an industry that never anticipated the rigorousness of this reclamation regulation and now finds itself nonviable, even pursuant to the Department of Energy's findings, it is going to generate revenue to adequately do this job, the job that the new regs will require.

I hope the hearings and the legislation that follow will address these problems as well as problems now facing the DOE enrichment enterprise, which my good friend, Senator Ford, is seriously concerned about. I share that specific part of the problem with him.

I emphasize the importance of addressing all of the issues in some manner. We cannot hope to achieve a policy without considering all of the elements in the fuel cycle together.

All of the problems we will be hearing about today and Friday are interrelated, broad in nature, and, at least from my standpoint, they could be dealt with together. For the good of our energy independence, our nuclear fuel cycle, the environment, and the mining industry, it seems to me we need to get on with trying to fix them all somewhat.

Thank you very much, Mr. Chairman.

Senator FORD. Thank you.

Senator Domenici, we are honored with the attendance of the Chairman of the "fool"—I mean the full—committee. How about that, I almost got that out. [General laughter.]

Senator FORD. It has been a long weekend and the Kentucky products have gotten me down. [General laughter.]

Senator FORD. I'm staying with one, however.

Senator Johnston, now that I have gotten all of the accolades out, would you care to say something?

The CHAIRMAN. Thank you, Mr. Chairman.

The "fool" Chairman of the full committee is here. [General laughter.]

STATEMENT OF HON. J. BENNETT JOHNSTON, A U.S. SENATOR FROM THE STATE OF LOUISIANA

The CHAIRMAN. Thank you, Mr. Chairman. I would like to say that I am pleased you are holding these hearings. It is a complicated, difficult subject. But I really think that we have to keep not only our uranium mining industry but our whole nuclear industry in a state of health—well "health" would not be the word because it is not healthy now—but at least we have to keep it alive and keep it ready to respond when it is called upon, as it will be called upon in the future, to respond to what I see as the mounting energy crisis that we will be facing.

It is certainly in a mess now. I do not know the exact formula for reviving it, for being fair, for making it healthy. But I hope we will find the answers here and in these continuing hearings you are having. I look forward to hearing from our good witnesses.

Senator FORD. Thank you.

Senator Bingaman.

STATEMENT OF HON. JEFF BINGAMAN, A U.S. SENATOR FROM THE STATE OF NEW MEXICO

Senator BINGAMAN. Thank you, Mr. Chairman.

I will associate myself with Senator Domenici's comments. I also have an opening statement that I would put into the record.

I just want to underline the seriousness of the problem. I think, at least in our State, we are approaching the time when you cannot gentlemanly have hearings on the uranium mining industry any more because we don't have one in New Mexico any more of any great significance. We have lost a great may jobs, and, of course, the level of imports has increased dramatically.

I hope that some solution to the problem can come out of this 100th Congress.

[The prepared statement of Senator Bingaman follows:]

STATEMENT BY SENATOR JEFF BINGAMAN
HEARINGS ON THE STATUS OF THE DOMESTIC
URANIUM INDUSTRY
March 9, 1987

Mr. Chairman, I want to thank you for scheduling this first of two hearings on the status of the uranium industry and DOE's uranium enrichment program. Our domestic uranium industry is unique in the special status accorded it under the Atomic Energy Act. That statute provides that the Department of Energy must assure the maintenance of a viable domestic uranium industry. No other mineral industry has this status. The reason for this status is clear: the domestic uranium industry is essential to U.S. national security and energy independence. Moreover, it is questionable how a strong enrichment enterprise can survive absent a viable domestic source for raw material.

Unfortunately, our domestic uranium industry is in a desperate condition. It is faced with 90 percent unemployment. Production is at its lowest levels since the 1950's, despite the fact that demand for uranium is at an all-time high. The New Mexico industry has virtually shut down with 8000 people out of work. We cannot expect a quick turn-around. It is my understanding that there are import license applications for South African origin uranium totalling over 58,000,000 pounds pending at the NRC. Much more is coming in from other sources. Virtually all new contracts are for foreign material, much of which enters the United States at prices far below those charged in non-U.S. markets.

None of this should be new to the Department of Energy. Senator Domenici, myself, and others have been calling it to the agency's attention for years. Indeed, DOE itself admits that the domestic uranium industry is non-viable. Yet the agency refuses to act.

I am deeply concerned that the problems faced by the domestic uranium industry be addressed, and I do not believe that the industry can long survive unless we take effective action to restore its vitality. This solution rests in dealing with the growing dependence on foreign imports and with assisting the industry in cleaning up its mill tailings. I hope this hearing will focus on these issues.

I look forward to the testimony.

Senator **Ford**. Senator Melcher, do you have a statement?

Senator **Melcher**. Thank you, Mr. Chairman. I have no opening statement or opening comments. I just came to learn a little bit about the problem.

Senator **Ford**. Mr. Merklein, if you would care to proceed with your statement, if you want to summarize it, we can put the total statement in the record, and then we can get to Mr. Rossin.

STATEMENT OF DR. HELMUT A. MERKLEIN, ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION, DEPARTMENT OF ENERGY, ACCOMPANIED BY R. GENE CLARK, DIRECTOR, NUCLEAR AND ALTERNATE FUELS DIVISION, ENERGY INFORMATION ADMINISTRATION

Dr. **Merklein**. Thank you, Mr. Chairman and Members of the committee.

I am pleased to be before you today to review the EIA, Energy Information Administration, data and analyses of the U.S. uranium mining and milling industry's viability and our projections of future prices, consumption, and supplies.

Accompanying me today, on my right, is Dr. Gene Clark, Director of EIA's Nuclear and Alternate Fuels Division.

We at EIA became involved in this effort in April 1983, when the Secretary of Energy assigned EIA, the responsibility for implementing the information collection and analysis requirements, but not the policy determination, of section 170B of the Atomic Energy Act of 1954, as amended.

That section requires the Secretary to monitor and determine annually, for the years 1983 through 1992, the status of the U.S. uranium mining and milling industry's viability.

To assist the Secretary in his determination, EIA collects data from the Nation's uranium and nuclear power industries on items such as uranium reserves, production, exploration, employment, financial performance, and market activity. These data are analyzed and published annually by EIA.

The latest such publication, which I am submitting for the record, is entitled, "Domestic Uranium Mining and Milling: 1985 Viability Assessment. '

This report was published in November 1986. Similar reports were published for the years 1983 and 1984.

[The Executive Summary of the report follows. The report is available from DOE.]

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Energy Information Administration
Office of Coal, Nuclear, Electric
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U.S. Department of Energy
Washington, DC 20585

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Executive Summary

Introduction

A statistical profile of the U.S. uranium industry is presented in this report, based on data obtained from the domestic industry concerning the status of major industry activities as of December 31, 1985. Industry data for calendar year 1985 were collected in the Energy Information Administration (EIA) survey entitled "Uranium Industry Annual Survey" (Form EIA-858). This survey, first used to collect industry data for calendar year 1984, and this report supplant several earlier U.S. Department of Energy (DOE) uranium industry surveys and reports concerning the uranium industry. Key historical time series of statistical data from earlier reports are updated and included here.

The principal findings of the survey are summarized below under two headings -- Uranium Raw Materials Activities and Uranium Marketing Activities. The first heading covers exploration and development, uranium resources, mine and mill production, and employment. The second heading covers uranium deliveries and delivery commitments, uranium prices, imports and exports of uranium, inventories, and other marketing activities.

Uranium Raw Materials Activities

Selected statistics on U.S. uranium raw materials activities for the period 1979 through 1985 are summarized in Table ES1 and Figure ES1 and described briefly in the following sections.

Table ES1. Uranium Raw Materials Summary Statistics

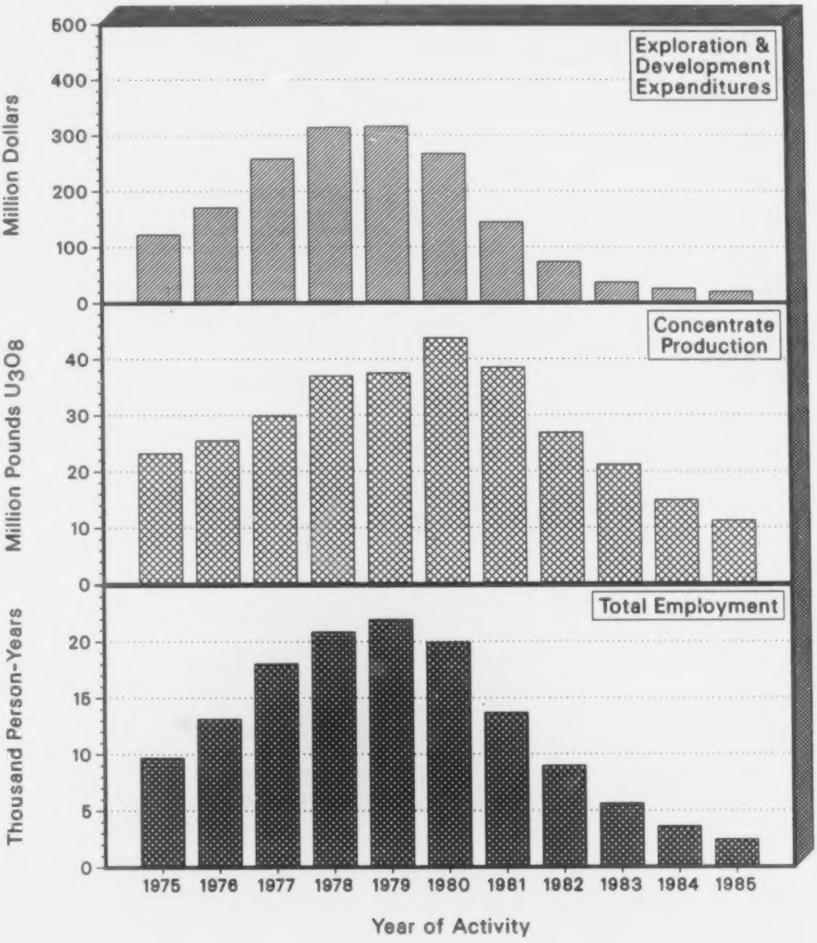
Item	1979	1980	1981	1982	1983	1984	1985
Exploration and Development							
Drilling (million feet)	41.1	28.2	14.2	5.4	3.2	2.6	1.8
Land Held for Exploration at End of Year (million acres)	17.2	14.9	9.6	5.2	4.6	3.4	2.9
Expenditures (million dollars)	315.91	266.96	144.76	73.61	36.86	26.48	20.10
Production							
Mine Production of Uranium (million pounds U_3O_8)	41.4	46.6	39.2	26.8	23.5	13.6	8.6
Concentrate Production (million pounds U_3O_8)	37.5	43.7	38.5	26.9	21.2	14.9	11.3
Economic Reserves at End of Year (million pounds U_3O_8)	NA	NA	NA	NA	NA	199.1	229.2
Employment (person-years expended)	21,951	19,919	13,676	8,967	5,615	3,597	2,446

NA, Not available.

Note: Totals may not equal sum of components due to independent rounding.

Sources: **Drilling**--Table 2. **Land Held**--Table 1. **Exploration and Development Total Expenditures**--Table 5. **Mine Production**--Table 20. **Concentrate Production**--Table 24. **Economic Reserves**--Table 19. **Employment**--Table 28.

Figure ES1. Uranium Raw Materials Summary Statistics, 1975-1985



Source: See Table ES1.

Exploration and Development

The number of companies with land holdings declined from 62 in 1984 to 52 in 1985. The area held likewise declined from 3.4 to 2.9 million acres. In 1985, 30 companies reported participating in domestic exploration activities, and they completed a total of 1.8 million feet of surface drilling. In 1984, by comparison, 43 companies completed a total of 2.6 million feet of surface drilling. The decline in surface drilling in 1985 continued a downward trend which commenced in 1979, following a peak of 48.1 million feet in 1978. Surface drilling declined in all States in 1985, except in Utah, where it increased by 78 percent.

Total exploration and development expenditures for 1985 were $20.10 million, a decline of 24 percent from the previous year. Foreign companies participating in domestic exploration contributed $5.2 million or approximately 26 percent of this total expenditure. The total estimate of industry planned exploration and development expenditures for 1986 is $19 million, including 1.9 million feet of exploration and development drilling.

Economic Reserves

Economic reserves of uranium, as reported by the uranium industry, were 229.2 million pounds U_3O_8 at the end of 1985, an increase of 15 percent from the 199.1 million pounds reported in 1984. A total of 19 companies reported resources in the economic reserves category for 1985, as compared to 23 companies for 1985. Prior to 1984, the Department of Energy and its predecessor agencies independently calculated discovered uranium reserves using industry-supplied engineering, borehole, and economic data. The reserves were categorized using criteria based on future capital investments plus operating costs per pound of recoverable U_3O_8. The reserves were termed "forward-cost" reserves. For 1984 and 1985, the "Uranium Industry Annual Survey," Form EIA-858, requested company-generated estimates of economic reserves from uranium industry companies. Collectively, the economic reserves estimates include a range of costs determined to be economic by each company based on current market prices and their existing contracts for the sale of uranium. For 1985, the annual survey also requested estimates of subeconomic reserves, which are measured reserves with production costs that currently exceed economic costs. A total of 42 companies reported resources in the subeconomic reserves category for 1985, and the total of all subeconomic reserves was 619.4 million pounds U_3O_8.

Approximately 80 percent of all the economic reserves reported were for uranium deposits located in three States – New Mexico, Wyoming, and Texas. Of the total economic reserves reported, 58 percent were estimated using nonconventional mining methods and 42 percent using conventional mining methods.

Mine Production of Uranium

Mine production of uranium from all sources declined from 13.6 million pounds U_3O_8 in 1984 to 8.6 million pounds in 1985. (A mine is defined as any man-made excavation into the earth for the development of a uranium deposit and the recovery of uranium. Also included is *in situ* mining, which employs drilling for the production of uranium from uraniferous solutions.) This decline of 37 percent in 1985 continued the trend of decreasing annual mine production of uranium that began in 1981.

Production of Uranium Concentrate

Production of uranium concentrate has declined each year from a peak of 43.7 million pounds of U_3O_8 in 1980 to 11.3 million pounds in 1985. Of this amount, 6.1 million pounds were produced by conventional milling methods and 5.2 million pounds were produced by "other" methods of uranium concentrate production, principally from *in situ* leaching and byproduct recovery from phosphate and copper mining. Production of U_3O_8 concentrate by "other" methods decreased by about 19 percent between 1981 (the peak year) and 1985. This decline, however, was not as rapid as that for conventional milling methods, which in the period from 1980 (the peak year for conventional milling) through 1985 declined by nearly 84 percent. As a consequence of this difference in the declining production rates, the overall share of the total domestic uranium concentrate production from "other" methods increased during that period.

The States with the greatest production of uranium concentrate in 1985 were Wyoming, Texas, and New Mexico, which together accounted for about 53 percent of the total domestic uranium concentrate production. From 1974 through 1983, New Mexico was the leading concentrate producer, but in 1984, Wyoming overtook New Mexico as the leading uranium concentrate producing State.

Employment

Employment in the uranium industry peaked at 21,951 person-years in 1979. It has declined each year since then, reaching 2,446 person-years in 1985, the lowest employment level in 19 years. Mining employment in 1985 accounted for 50 percent of all uranium industry employment, while exploration accounted for less than 7 percent. During the peak year of 1979, 60 percent of industry employment was in mining and 18.5 percent in exploration. In 1985, the States of Texas, Wyoming, and New Mexico accounted for approximately 20.8, 20.1, and 19.4 percent of all industry employment, respectively.

Uranium Marketing Activity

Selected statistics on uranium marketing activity for the 1979 through 1985 period are shown in Table ES2 and Figure ES2. These and related data are summarized in the following sections.

Domestic Purchase Commitments by Utilities

In 1985, U.S. electric utilities signed 35 new uranium purchase contracts with domestic suppliers[1] covering 8.2 million pounds of uranium. Of this amount, 2.8 million pounds were delivered in 1985. Domestic suppliers delivered a total of 21.7 million pounds of uranium to domestic utilities in 1985. At the end of 1985, market commitments for delivery in 1986 and beyond totaled 198.0 million pounds uranium and represented a decrease of 27.7 million pounds from similar estimates reported in the *Uranium Industry Annual 1984.*

Table ES2. Uranium Marketing Activity Summary Statistics

Item	Year of Delivery						
	1979	1980	1981	1982	1983	1984	1985
Deliveries to Domestic Utilities[a] (million pounds U_3O_8)	[b]33.0	[b]35.0	[b]32.6	27.1	24.2	22.5	21.7
Average Price of Delivered Uranium (dollars per pound U_3O_8)	[b]23.65	[b]28.15	[b]34.65	38.37	38.21	32.65	31.43
Quantity of Uranium Imported[c] (million pounds U_3O_8)	3.0	3.6	6.6	17.1	8.2	12.5	11.7
Average Price of Imported Uranium (dollars per pound U_3O_8)	NA	43.10	32.90	[d]R27.23	26.16	21.86	20.08
Quantity of Uranium Exported (million pounds U_3O_8)	6.2	5.8	4.4	6.2	3.3	2.2	5.3

[a] Excludes direct imports by domestic utilities.

[b] Includes delivery commitments to domestic utilities and agents.

[c] Includes imports by domestic utilities and domestic suppliers.

[d] Computation of quantity-weighted average price excludes the quantity associated with a large exchange transaction that occurred in 1982.

NA, Not available.

Sources: 1979—U.S.Department of Energy, Assistant Secretary for Resource Applications, Office of Uranium Resources and Enrichment, *Survey of United States Uranium Marketing Activity,* DOE/RA-0063 (Washington, DC, July 1980). 1980-1981—U.S. Department of Energy, Assistant Secretary for Nuclear Energy, Office of Uranium Enrichment and Assessment, *Survey of United States Uranium Marketing Activity,* DOE/NE-0013 and DOE/NE-0013/1 (Washington, DC, June 1981 and July 1982). 1982—Energy Information Administration, *1982 Survey of United States Uranium Marketing Activity,* DOE/EIA-0403 (Washington, DC, September 1983). 1983—Energy Information Administration, *Survey of United States Uranium Marketing Activity 1983,* DOE/EIA-0403(83) (Washington, DC, August 1984). 1984—Energy Information Administration, *Uranium Industry Annual 1984,* DOE/EIA-0478(84) (Washington, DC, October 1985). 1985—Energy Information Administration, Form EIA-858, "Uranium Industry Annual Survey" (1985).

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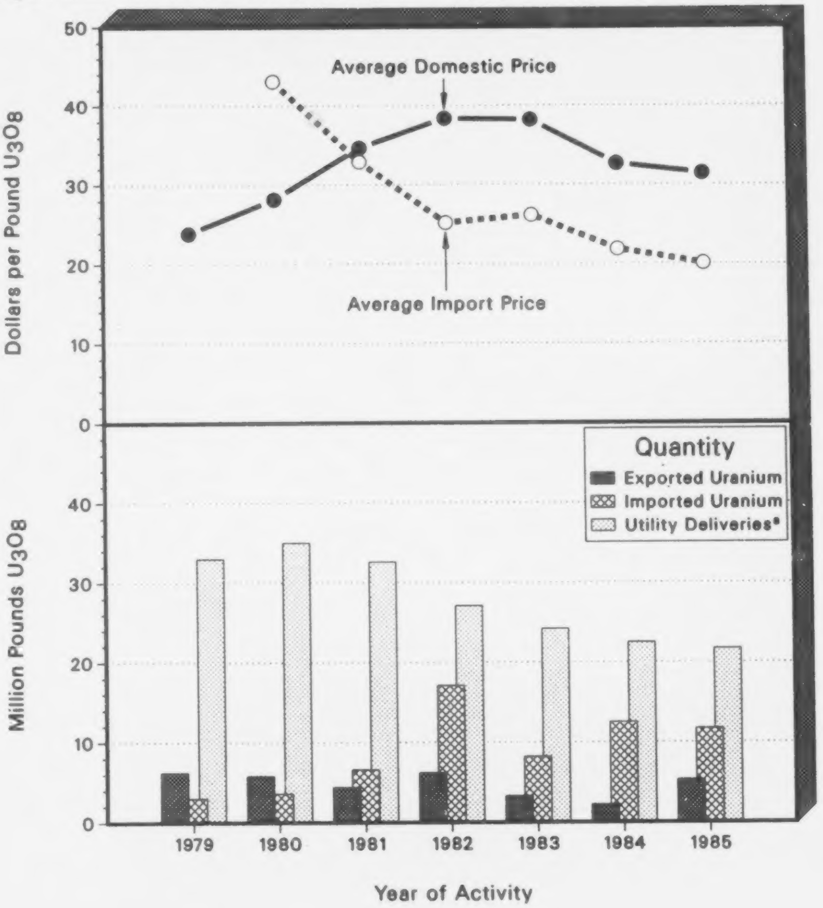
[1] For the purpose of this report, the term "domestic suppliers" means domestic companies that sell uranium and are not electric utility companies. This includes uranium producers and agents. See the Glossary for a definition of "domestic uranium industry."

Figure ES2. Uranium Marketing Activity Summary Statistics, 1975-1985



[a]Deliveries to domestic utilities from domestic suppliers.

Source: See Table ES2.

Uranium Prices and Procurement Arrangements

The reported price of uranium delivered to domestic utilities from domestic suppliers in 1985 averaged $31.43 per pound U_3O_8; prices ranged from approximately $10 per pound to over $100 per pound. The weighted average price per pound for 1985 deliveries for contracts signed in 1985 was $15.13. Settlements of market price contracts averaged $27.15 per pound U_3O_8; however, for settlements in which the contracts had no floor price, the average settled price was $15.46 per pound U_3O_8. This represents a decrease of 8 percent from the previous year in the average settled price under market price contracts without a floor price. About 52 percent of the uranium deliveries in 1985 were governed by contract price, 41 percent by market price, and 7 percent by "other." For all delivery years combined (1985-2000 and later) as of the end of 1985, contract price procurement accounts for 32 percent, market price accounts for 43 percent, and "other" procurement arrangements account for 25 percent.

Of the quantity of uranium committed for delivery in 1985 and beyond under market price arrangments, 64.6 percent had no floor, 17.0 percent had a price floor, and 18.4 percent had a cost floor. The total amount of uranium involved in market price commitments for this period was 93.6 million pounds. Forty-four percent of the market price deliveries in 1985 had no floor price.

Foreign Purchases and Sales

Imports of uranium totaled 11.7 million pounds in 1985. The average price was $20.08 per pound, down by $1.78 per pound from the previous year. Commitments for 1986 uranium imports total 10.3 million pounds.

Inventories

Inventories of domestic- and foreign-origin uranium held by domestic utilities decreased in 1985, from 160.2 million pounds U_3O_8 equivalent at the end of 1984 to 153.8 million pounds in 1985. Total commercial inventories decreased by 9.9 million pounds U_3O_8 equivalent from 185.2 million pounds in 1984 to 175.3 million pounds in 1985.

Secondary Market Transactions

Total secondary market transactions in 1985 were approximately 13.6 million pounds U_3O_8 equivalent, compared to 12.3 million pounds U_3O_8 equivalent reported for 1984.

Unfilled Uranium Requirements

Estimates of unfilled uranium requirements for the period 1986 to 1994 decreased slightly from 142.0 million pounds U_3O_8 determined at the end of 1984 to 140.7 million pounds determined at the end of 1985.

Uranium Available for Sale

At the end of 1985, domestic suppliers reported 237.2 million pounds of uncommitted uranium available for sale at unlimited prices for the 1986 to 1995 period. Most of this material (184.8 million pounds U_3O_8) is available at prices of $40 per pound or less.

Dr. **Merklein**. The EIA viability assessment focuses on four major criteria of the uranium industry's viability, established through a 1983 rulemaking. These four criteria are:

Resource capability: whether the uranium industry has adequate uranium reserves to supply U.S. needs;

Supply response capability: whether the mining and milling industry has enough production capacity to meet U.S. needs;

Financial capability: whether the industry is able to raise the funds necessary to maintain adequate production capacity; and

Import commitment dependency: whether contracts for importation of uranium represent more than 37.5 percent of U.S. uranium requirements for any period covering two consecutive years.

The first three of these criteria are measured against the needs of the U.S. nuclear power industry in the event of a hypothesized disruption of uranium import supplies; thus, in some measure, they represent our uranium industry's ability to respond to import disruptions.

In the EIA report on the uranium industry's viability for the year 1985—the last report—we estimated that the Nation's uranium reserves were adequate to cover our needs under the hypothesized import disruptions. We also estimated that the industry's mining and milling capacity is adequate to respond to disruptions in the near term, but that in the future, domestic production capacity would not be sufficient to respond to a disruption of one-third of imports over the 1991 to 2000 time period.

In the financial capability area, we concluded, and I quote, that "nearly all current and expected short-term indicators of the domestic uranium industry's condition are weak." For example, the industry suffered a net income loss of $350 million in 1985, following losses of about $307 million in 1984.

For import commitment dependency, we concluded that import contracts in place at the end of 1985 did not exceed 37.5 percent of domestic requirements now, nor for any future time span covering two consecutive years.

However, we projected an increasing reliance on uranium imports in the future such that actual, as opposed to currently contracted, imports in the 1990s would represent 45 to 60 percent of domestic consumption for that period.

This Committee also requested that EIA testify on the structure of world uranium markets, in addition to the viability of the U.S. uranium industry.

The EIA report on the industry's 1985 viability includes information on the world uranium market structure, since the U.S. uranium industry's viability is impacted by the world situation.

The report characterizes the world uranium market by pointing out that both domestic and foreign consumer inventories of uranium are high, representing over five years' worth of future consumption.

About half the uranium needs of U.S. utilities for the 1986 to 1995 period were already contracted for at the end of 1985. Contract coverage of foreign utilities is much higher.

Countries outside the Centrally Planned Economies with significant uranium export potential are Australia, Canada, South Africa, and other countries, primarily Gabon, Namibia, and Niger, which, in the past, have not generally exported into the United States. Other than the United States and Canada, countries which are major uranium consumers, such as those of Western Europe and the Far East, do not produce much, if any, uranium.

The final area of interest expressed in the Committee's request was EIA's projection of uranium prices, supplies, and consumption worldwide. These topics are also covered in the EIA report mentioned earlier, and that is now part of the record.

Because of continued high inventory levels and other supplies, we expect prices for new uranium supply contracts to remain below $20 per pound of uranium oxide, that is, in constant 1985 dollars, through the rest of this decade.

During the 1990s, we expect uranium prices to rise above $20 per pound, eventually reaching $30 per pound by the end of the century.

We expect domestic consumption of uranium to remain at a fairly constant level, around 35 million pounds per year, through the rest of the century.

In contrast, we expect foreign consumption to steadily rise from its current level of about 60 million pounds per year up to the range of 80 or 90 million pounds per year by the end of the century.

As mentioned earlier, we expect about 45 to 60 percent of domestic consumption to be supplied from imports, assuming no imposition of import controls. From 30 to 40 percent of our consumption is expected to come from domestic production, with the rest coming from inventory drawdowns.

I hope this summary of the world's uranium market situation has provided an adequate overview for the Committee's needs. Dr. Clark will be happy to answer any technical questions that you may have.

Thank you very much.

[The prepared statement of Dr. Merklein follows:]

Statement of the Honorable Helmut A. Merklein
Administrator, Energy Information Administration
U.S. Department of Energy

Before The

United States Senate
Committee on Energy and Natural Resources
Subcommittee on Energy Research and Development

March 9, 1987

Mr. Chairman and Members of the Committee, I am pleased to be before you today to review the Energy Information Administration's (EIA's) data and analyses of the U.S. uranium mining and milling industry's viability and our projections of future prices, consumption, and supplies. Accompanying me today is Dr. Gene Clark, Director of EIA's Nuclear and Alternate Fuels Division.

We became involved in this effort in April 1983 when the Secretary of Energy assigned to EIA the responsibility for implementing the information collection and analysis requirements of Section 170B of the Atomic Energy Act of 1954, as amended. That section requires the Secretary to monitor and determine annually, for the years 1983 through 1992, the status of the U.S. uranium mining and milling industry's viability.

To assist the Secretary in his determination, EIA collects data from the Nation's uranium and nuclear power industries on items such as uranium reserves, production, exploration, employment, financial performance and marketing activity. These data are analyzed and published annually by EIA. The latest such publication, which I am submitting for the record, is the Domestic Uranium Mining and Milling: 1985 Viability Assessment. This report was published in November 1986. Similar reports were published for the years 1983 and 1984.

The EIA viability assessment focuses on four major criteria of the uranium industry's viability, established through a 1983 rulemaking. These four criteria are:

Resource Capability

Whether the uranium industry has adequate uranium reserves to supply U.S. needs;

Supply Response Capability

Whether the mining and milling industry has enough production capacity to meet U.S. needs;

Financial Capability

Whether the industry is able to raise the funds necessary to maintain adequate production capacity; and

Import Commitment Dependency

Whether contracts for importation of uranium represent more than 37.5 percent of U.S. uranium requirements for any period covering two consecutive years.

The first three of these criteria are measured against the needs of the U.S. nuclear power industry in the event of hypothesized disruptions of uranium import supplies; thus, in some measure, they represent our uranium industry's ability to respond to import disruptions.

In the EIA report on the uranium industry's viability for the year 1985, we estimated that the Nation's uranium reserves were adequate to cover our needs under the hypothesized import disruptions. We also estimated that the industry's mining and milling capacity is adequate to respond to disruptions in the near term, but that in the future, domestic production capacity would not be sufficient to respond to a disruption of one-third of imports over the 1991 to 2000 time period.

In the financial capability area, we concluded that "nearly all current and expected short-term indicators of the domestic uranium industry's condition are weak..." For example, the industry suffered net-income losses of $350 million in 1985, following losses of about $307 million in 1984.

For import commitment dependency, we concluded that import contracts in place at the end of 1985 did not exceed 37.5 percent of domestic requirements now, nor for any future time span covering two consecutive years. However, we projected an increasing reliance on uranium imports in the future, such that actual (as opposed to currently contracted) imports in the 1990's would represent 45 to 60 percent of domestic consumption for that period.

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The report characterizes the world uranium market by pointing out that both domestic and foreign consumer inventories of uranium are high, representing over 5 years' worth of future consumption. About half the uranium needs of U.S. utilities for the 1986 to 1995 period were already contracted for at the end of 1985; contract coverage of foreign utilities is much higher.

Countries outside the Centrally Planned Economies with significant uranium export potential are Australia, Canada, South Africa, and other countries (primarily Gabon, Namibia, and Niger) which, in the past, have not generally exported into the United States. Other than the United States and Canada, countries which are major uranium consumers (such as those of Western Europe and the Far East) do not produce much, if any, uranium.

The final area of interest expressed in the Committee's request was EIA's projection of uranium prices, supplies, and consumption worldwide. These topics are also covered in the EIA report mentioned earlier. Because of continued high inventory levels and other supplies, we expect prices for new uranium supply contracts to remain below $20 per pound of uranium oxide (in constant 1985 dollars) through the rest of this decade. During the 1990's, we expect uranium prices to rise above $20 per pound, eventually reaching $30 per pound by the end of the century.

We expect domestic consumption of uranium to remain at a fairly constant level, around 35 million pounds per year through the rest of the century. In contrast, we expect foreign consumption to rise steadily from its current level of about 60 million pounds per year up to the range of 80 to 90 million pounds per year by the end of the century. As mentioned earlier, we expect about 45 to 60 percent of domestic consumption to be supplied from imports, assuming no imposition of import controls. From 30 to 40 percent of our consumption is expected to come from domestic production, with the rest coming from inventory drawdown.

I hope this summary of the world's uranium market situation has provided an adequate overview for the Committee's needs.
Dr. Clark and I will be happy to answer any questions you may have.

Senator FORD. Thank you, sir.

Mr. Rossin, do you want to go ahead with your statement? Then we will get to questions of both individuals.

STATEMENT OF DR. A. DAVID ROSSIN, ASSISTANT SECRETARY FOR NUCLEAR ENERGY, DEPARTMENT OF ENERGY, ACCOMPANIED BY JAMES W. VAUGHAN, JR., PRINCIPAL DEPUTY ASSISTANT SECRETARY FOR NUCLEAR ENERGY

Dr. ROSSIN. Thank you, Mr. Chairman.

I am pleased to be here today to discuss the status of the domestic uranium mining industry and the reclamation of uranium mill tailings at active mining and processing sites.

I will also summarize the status of pending litigation involving the Department and certain uranium mining companies.

Accompanying me this afternoon is my Deputy, James W. Vaughan, Jr., who will assist me in responding to your questions.

Let me summarize my written statement, which I would appreciate being included in today's hearing.

First, I would like to discuss the status of the uranium mining industry in this country.

During the 1970s, increased civilian reactor orders and forecasts of sharp growth in nuclear power through the year 2000 led to an expansion in U.S. uranium exploration, development, drilling and production. Large inventories of uranium were built up because production, based on long-term utility commitments, had been much greater than actual requirements.

As Dr. Merklein reported, U.S. utilities currently have four to five years 'worth of uranium, compared to the desired working inventory of about one year's supply.

The Secretary of Energy is required by section 170B of the Atomic Energy Act to make an annual determination of the viability of the U.S. uranium mining and milling industry. The basis for this determination and the EIA analysis has been separately discussed by Dr. Merklein.

In the Secretary's first determination, the industry was found to be viable for calendar year 1983, and the industry was found not viable for calendar years 1984 and 1985.

After the determination that the domestic uranium mining industry was not viable for calendar year 1984, the Secretary requested that the U.S. Trade Representative evaluate the appropriateness and likely effectiveness of remedies under existing trade laws to help the U.S. industry, as well as the trade policy implications of initiating action under these laws.

The U.S. Trade Representative subsequently advised the Secretary that action under U.S. trade statutes did not appear to be appropriate in regard to both the short and long term problems facing the domestic uranium mining and milling industry.

With respect to actions under section 161v. of the Atomic Energy Act, the U.S. Trade Representative concluded that a major consequence of restricting the enrichment of foreign uranium would be the shift of enrichment activity from U.S. Government facilities to foreign facilities, thereby eroding the position of the U.S. uranium enrichment enterprise.

I have attached to my written statement a copy of the Secretary's request and the U.S. Trade Representative's response.

The basic problems of the domestic uranium mining and milling industry cannot be cured by DOE. These problems are:

One, reduced uranium demand due to nuclear power plant cancellations, stretch-out of plant construction periods, and the lower-than-projected growth of nuclear powerplants in the U.S.;

Two, low-grade domestic ore. Many foreign producers have higher-grade ore that can be brought to the market at a lower price than ore mined and milled in the United States; and

Three, excess uranium inventories owned by U.S. and foreign utilities and uranium producers.

DOE's enrichment policies should not be changed in an attempt to subsidize the uranium producing industry. We do not believe that restricting the enrichment of foreign uranium for domestic use will assure the viability of the domestic uranium industry.

Any ban on the enrichment of foreign uranium for domestic customers could have an undesirable effect on both the U.S. uranium mining industry and the U.S. enrichment business, forcing utilities to go abroad for both their uranium and enrichment services, thus making the overall situation worse.

If DOE customers were to terminate their contracts in favor of overseas enrichers, they might obtain all their natural uranium from foreign producers who offer attractively priced package deals. Thus, the loss of enrichment sales to domestic utilities by DOE could further damage the U.S. uranium mining and milling industry.

Turning to the reclamation of uranium mill tailings at active uranium mining and processing sites, concerns over the uncontrolled disposition of uranium mill tailings, with their potential for adverse public health and safety impacts, led to the enactment in 1978 of the Uranium Mill Tailings Radiation Control Act and the requirement for Federal action at inactive, or Title I, sites.

The Department recognizes that the costs associated with tailings reclamation at active, or Title II, mining and processing sites remains an issue for many in the uranium industry. The Department has previously testified and continues to believe that financial responsibility for the reclamation of Title II mining and processing sites should continue to be borne by the owners, as currently provided under the 1978 law. Further, DOE involvement in managing the cleanup of Title II sites is not necessary and should be avoided to simplify execution of the various projects and reduce costs.

Since the responsibility for selecting and performing remedial action at the processing sites is strictly between the licensed owner and either the Nuclear Regulatory Commission or the Agreement State, any necessary Federal oversight responsibilities can be exercised by the Nuclear Regulatory Commission.

In 1985, the Department testified before this Subcommittee in a joint hearing with the House Interior and Insular Affairs Subcommittee on Energy and the Environment on the status of its Title I program and the lessons learned from our experience in carrying out its responsibilites under the law.

In that testimony, we provided a preliminary estimate that the cost for reclamation of Title II sites could approach $4 billion if DOE's cost experience with the Title I sites were directly applicable.

This preliminary estimate was made using a direct extrapolation, based on average reclamation per pound of tailings for the Federally-managed Title I program, which includes some sites where tailings have had to be moved to alternate locations, rather than stabilized in place.

Due to the economies of scale associated with the typically larger quantities of tailings at Title II sites, and not having to relocate tailings piles, as has been required for some Title I sites, the reclamation cost per unit weight of tailings should be lower for active sites.

Taking this into account, as well as the savings associated with not having the Federal Government responsible for project management and control, we now estimate that the Title II reclamation effort may be more on the order of $1 billion to $2 billion.

This estimate does not include costs associated with potential, additional reclamation needs, such as cleanup of contaminated vicinity properties, restoration of contaminated ground water and reclamation of thorium sites.

Finally, as requested in your letter of invitation, my written statement summarizes the status of our litigation involving the Department of Energy and certain uranium mining companies.

Briefly, in September, 1985, the U.S. District Court for the District of Colorado ruled in favor of the miners on Count II, which related to the administrative procedures followed by DOE in promulgating the utilities services' contracts.

DOE filed an appeal of this ruling.

In June, 1986, the District Court ruled in favor of the miners on Count I, which related to whether DOE's actions to meet section 161v. obligations required imposing limits on the amount of foreign uranium that may be enriched for domestic end use. The District Court issued an injunction restricting DOE's enrichment of foreign origin uranium.

On June 24, 1986, DOE filed its notice of appeal of the District Court's ruling on Count I with the U.S. Court of Appeals for the Tenth Circuit, and requested a stay of that injunction.

The Tenth Circuit subsequently consolidated our appeal of Count I with our appeal of Count II. Oral argument on both appeals was held in September, 1986, and a decision is pending.

DOE continues to conduct its enrichment business pending the decision of the Appellate Court.

Mr. Chairman, this completes my statement, and we would be pleased to respond to your questions at this time.

[The prepared statement of Dr. Rossin follows:]

STATEMENT BY
DR. A. DAVID ROSSIN
ASSISTANT SECRETARY FOR NUCLEAR ENERGY
U.S. DEPARTMENT OF ENERGY
BEFORE THE
SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT
COMMITTEE ON ENERGY AND NATURAL RESOURCES
U.S. SENATE

MARCH 9, 1987

Mr. Chairman, I am pleased to be here today to discuss the status of the domestic uranium mining industry and an estimate of the costs of the reclamation of uranium mill tailings at active mining and processing sites. In accordance with your letter of invitation, I will also briefly summarize the status of pending litigation involving the Department and certain uranium mining companies.

STATUS OF THE DOMESTIC URANIUM MINING INDUSTRY

During the 1970's, increased civilian reactor orders and forecasts of sharp growth of nuclear power through the year 2000 led to an expansion in U.S. uranium exploration, development drilling, and production. U.S. uranium production went from a level of about 25 million pounds of uranium oxide powder (U308, or "yellowcake") in 1971 to a record production level of 43.7 million pounds in 1980. Large inventories of uranium were built up because production, based on long-term utility commitments, had been much greater than actual requirements. U.S. uranium production fell to about 15 million pounds of U308 in 1984 and continued to decline to about 11 million pounds in 1985. We estimate that the industry produced about

13 million pounds of U3O8 in 1986. U.S. utilities now own 4 to 5 years worth of uranium inventory, compared to the desired working inventory of about 1 year's supply.

The much lower growth rate of nuclear power, coupled with excessive inventories in the hands of utilities and miners, have reduced the market demand for uranium throughout the world. As a result of such factors as low grade ore in some areas, excess mining capacity, and large inventories, the spot price of uranium is now almost 50 percent of the average price for delivery under older, long-term contracts.

Viability Determination

The Secretary of Energy is required by Section 170(B) of the Atomic Energy Act to make an annual determination of the viability of the U.S. uranium mining and milling industry. The determination is based on statutorily authorized criteria and information and analysis provided by the Department's Energy Information Administration (EIA), which has been separately discussed by the EIA Administrator, Dr. Helmut A. Merklein. In the first such determination, the industry was found to be viable for calendar year 1983. The industry was found not viable in calendar years 1984 and 1985.

Report by the U.S. Trade Representative

After the determination that the domestic uranium mining industry was not viable in calendar year 1984, the Secretary requested that the U.S. Trade Representative (USTR) evaluate the appropriateness and likely effectiveness of remedies under existing trade laws to help the U.S. industry, as well as the trade policy implications of initiating action under these laws.

The USTR subsequently advised the Secretary that action under the U.S. trade statutes did not appear to be appropriate in regard to both the short and long-term problems facing the domestic uranium mining and milling industry. The USTR concluded that any remedy granted under existing law which might provide the relief requested by the industry would only be short-term; at the same time, there would be an adverse impact on our trading partners without resolving the long-term problems of the industry. With respect to actions under Section 161(v) of the Atomic Energy Act, the USTR concluded that a major consequence of restricting the enrichment of foreign uranium would be the shift of enrichment activity from U.S. government facilities to foreign facilities, thereby eroding the position of the U.S. uranium enrichment enterprise. Copies of the Secretary's request and the USTR response are attached.

DOE Cannot Make the Problem Go Away

The basic problems of the domestic uranium mining and milling industry cannot be cured by the Department of Energy (DOE). These problems are:

- Reduced uranium demand due to nuclear powerplant cancellations, stretchout of plant construction, and lower than projected nuclear growth.
- Low grade domestic ore. Many foreign producers have higher grade ore that can be brought to the market at a lower price than U.S. material.
- Excess uranium inventories owned by U.S. and foreign utilities and uranium producers.

Section 161(v) of the Atomic Energy Act provides that DOE, "to the extent necessary to assure the maintenance of a viable domestic uranium industry, shall not offer...(enrichment) services for source or special nuclear material of foreign origin intended for use in a utilization facility or under the jurisdiction of the U.S." DOE does not believe that its determinations that the uranium mining industry has not been viable in either 1984 or 1985, standing alone, either authorizes or requires imposing restrictions on the enrichment of feed material of foreign origin under Section 161(v). Instead, our interpretation of Section 161(v) indicates that DOE should continue its analysis by considering, in the words of the statute, "the extent" to which restricting enrichment of foreign source material for domestic end use will, in fact, "assure the maintenance of a viable domestic uranium industry."

As reflected in the supplemental material accompanying the revised Uranium Enrichment Services Criteria, which were issued by rulemaking and implemented following Congressional review in 1986, DOE's view is that restrictions would not assist the domestic mining and milling industry in any meaningful way. DOE enrichment policies should not be changed in an attempt to subsidize the uranium producing industry. Restricting the enrichment of foreign uranium for domestic use will not assure the viability of the domestic uranium industry. Any ban on the enrichment of foreign uranium for domestic customers could have an undesirable effect on both the U.S. uranium mining industry and the U.S. enrichment business, by forcing utilities to go abroad for both their uranium and enrichment services, thus making the overall situation worse. A ban on domestic end use would not affect our enrichment services for foreign customers and would increase the use of potentially higher-cost, U.S.-produced material.

Rather than help, import restrictions could have undesirable effects on both the domestic uranium industry and the DOE enrichment enterprise. A sweeping limitation would likely cause many of DOE's customers to reconsider their enrichment contracts with DOE due to the potentially higher costs of purchasing natural uranium of U.S. origin. If DOE customers were to terminate their contracts in favor of overseas enrichers, they might obtain all of their natural uranium from foreign producers who offer attractively-priced package deals. Thus, the loss of enrichment sales to domestic utilities by DOE could further damage the U.S. uranium mining and milling industry.

RECLAMATION OF URANIUM MILL TAILINGS AT ACTIVE PROCESSING SITES

Concerns over the uncontrolled disposition of uranium mill tailings, with their potential for adverse public health and safety impacts, led to the passage of Public Law 95-604, the Uranium Mill Tailings Radiation Control Act of 1978. Title I of that Act directed the Department to carry out appropriate remedial actions for certain inactive, largely abandoned uranium processing sites. Title II assigned responsibility for the decommissioning and stabilization of the licensed sites to the site owners under license with either the Nuclear Regulatory Commission (NRC) or the applicable agreement State. The legislation also authorized the Environmental Protection Agency (EPA) to establish standards for the cleanup of the processing sites and the final disposal of the mill tailings.

The Department recognizes that the cost associated with tailings reclamation at the Title II sites remains an issue for many in the uranium industry. The Department has previously testified and continues to believe that financial responsibility for the reclamation of Title II mining and processing sites should continue to be borne by the owners as currently provided by Public Law 95-604. Further, DOE involvement in managing the cleanup of Title II sites is not necessary and should be avoided; this will simplify execution of the various projects and reduce costs. Since the responsibility for selecting and performing remedial action at the processing sites is strictly between the licensed owner and the NRC (or agreement State), any necessary Federal oversight responsibilities can be exercised by the NRC.

In July 1985, the Department testified before this Subcommittee (in a joint hearing with the House Interior and Insular Affairs Subcommittee on Energy and the Environment) on the status of its Title I program and the lessons-learned from our experience in carrying out its responsibilities under Public Law 95-604. In that testimony, we provided a preliminary estimate that the cost for reclamation of the sites covered by Title II of the Act could approach $4 billion if DOE's cost experience with the Title I sites were directly applicable. This preliminary estimate was made using a direct extrapolation based on average reclamation costs per pound of tailings for the Federally-managed Title I program, which includes some sites where tailings have had to be moved to alternate locations rather than stabilized in place. Due to (1) economies of scale associated with the typically larger quantities of tailings at Title II sites, and (2) not having to relocate tailings piles as have been required for some Title I sites, the reclamation cost per unit weight of tailings should be lower for active sites. Taking this into account, as well as the savings associated with not having the Federal Government responsible for project management and control, we now estimate that the Title II reclamation effort may be more on the order of $1 to $2 billion. This estimate does not include costs associated with potential additional reclamation needs, such as cleanup of contaminated vicinity properties, restoration of contaminated ground water, and reclamation of thorium sites.

PENDING LITIGATION INVOLVING THE URANIUM ENRICHMENT ENTERPRISE

Finally, as requested in your letter of invitation, I will briefly summarize the status of pending litigation involving the Department of Energy and certain uranium mining companies.

On December 7, 1984, a suit was filed in U.S. District Court for the District of Colorado by Western Nuclear, Inc., Energy Fuels Nuclear, Inc., and Uranium Resources, Inc., against DOE and various Departmental officials, alleging 5 complaints:

- Count I. DOE failed to meet its statutory obligations contained in Section 161(v) of the Atomic Energy Act to assure the viability of the domestic mining and milling industry by not limiting the amount of foreign-origin uranium that may be enriched for domestic end use. DOE should be ordered to adopt limitations on domestic use of foreign uranium.

- Count II. DOE failed to follow proper procedures in promulgating the Utility Services (US) contracts, and it should thus be declared null and void. Specifically, DOE failed to follow the Administrative Procedures Act and failed to submit the contract to Congress for 45 days prior to its issuance as required for criteria changes by the Atomic Energy Act.

- Count III. DOE uses a "fixed tails" policy in selling its services which limits the demand for domestic uranium. DOE should be barred from its continued use.

- Count IV. DOE is selling enriched uranium of foreign origin from its stockpiles. This inhibits and prevents the development of sources of supply outside of DOE, a violation of Section 161(m) of the Atomic Energy Act. DOE should be precluded from selling out of inventory.

- Count V. DOE's Criteria and regulations defining "viability" for purposes of conducting the annual viability analysis required by law are incompatible with the statute and were adopted using incorrect procedures.

On September 19, 1985, the Court ruled in favor of the miners on Count II and declared the US contract null and void. DOE filed an appeal, which is now pending before the U.S. Court of Appeals for the Tenth Circuit.

On June 5, 1986, oral arguments on the remaining counts were heard in U.S. District Court. Following presentation of the arguments, Count I was decided in favor of the miners and the Court issued an injunction restricting DOE's enrichment of foreign origin uranium; Count III was stayed for a period of 90 days; Count IV was decided in favor of DOE; and Count V was withdrawn without prejudice by the miners.

On June 24, 1986, DOE filed its notice of appeal of the District's Court ruling on Count I and requested a stay of the injunction previously entered by the Court pending appeal. The Tenth Circuit granted DOE's request, and consolidated the appeal of Count I with the appeal of Count II. Oral argument on both appeals was held before the U.S. Court of Appeals for the Tenth Circuit in September 1986, and a decision is pending.

In accordance with the FY 1987 Continuing Resolution, DOE will continue to conduct its enrichment business pending the decision of the appellate courts.

Mr. Chairman, this completes my statement. My colleagues and I would be pleased to respond to your questions at this time.

THE SECRETARY OF ENERGY
WASHINGTON, D.C. 20585

September 26, 1985

Honorable Clayton Yeutter
United States Trade Representative
600 - 17th Street, N.W.
Washington, D.C. 20506

Dear Mr. ~~Ambassador~~: Clay

Section 170B of the Atomic Energy Act of 1954, 42 U.S.C. 2210b, requires the Secretary of Energy for the years 1983 to 1992 to report annually to the Congress and the President a determination of the viability of the domestic uranium mining and milling industry. Based on the criteria specified in the statute and its implementing regulations, I have determined for the year 1984 that the domestic uranium mining and milling industry was not viable.

Section 170B also authorizes me to make a determination that source material (natural uranium) or special nuclear material (enriched uranium) from foreign sources is being imported in such increased quantities as to be a substantial cause of serious injury, or threat thereof, to the United States uranium mining and milling industry. Should I make this determination, section 170B requires the U.S. Trade Representative to request that the U.S. International Trade Commission initiate an investigation under section 201 of the Trade Act of 1974.

Imports of uranium in 1984 represented 37.4% of domestic requirements. Current import commitments for future delivery of uranium make up no more than 26 to 32% of total annual U.S. requirements in any year. However, a growing portion of currently-unfilled requirements is likely to be supplied by foreign-origin uranium; the Energy Information Administration projects that imports will meet from 50 to 70% of requirements throughout the 1990's.

Because of its relationship to section 201 of the Trade Act, such a determination of injury or threat thereof under section 170B of the Atomic Energy Act could implicate complex issues of international trade. The facts and implications pertaining to any such determination should be carefully examined by agencies within the Executive Branch whose major responsibilities include formulating and implementing foreign and trade policy.

In view of these considerations, I believe it would be preferable for your office to examine this matter with a view to determining the appropriate available courses of action rather than my making the determination of injury from imports under section 170B at this time. I would appreciate receiving your preliminary recommendations within three months.

The Department will be pleased to provide any assistance it can as your office examines this matter. Please feel free to contact Under Secretary Salgado, or Mr. Edward Hanrahan of his staff, in order to secure this assistance.

Yours truly,

John S. Herrington

THE UNITED STATES TRADE REPRESENTATIVE
WASHINGTON
20506

December 26, 1985

Honorable John Herrington
Secretary of Energy
Washington, D.C. 20585

Dear John:

As a follow-up to your request of September 26 for an examination of the situation of the domestic uranium mining and milling industry, we have completed our review of the issue and are now able to provide you with preliminary recommendations.

This is one of the more difficult questions we have studied in recent months. It involves, as many trade issues do, trying to achieve a delicate balance of domestic industry concerns, consumer interests, general economic policy, foreign, and, of course, trade policy concerns. Sometimes a policy option will emerge in the course of analysis which arrives at a desired balance that leaves most parties at least relatively satisfied with the outcome. Unfortunately, in this case, that seems impossible.

In reviewing the economic situation of the U.S. uranium industry, we drew on existing expertise within various U.S. Government agencies, including your own Department. Also included in our interagency working group were the Departments of State and Commerce and the Office of Management and Budget. We consulted with interested parties outside the Government on an informal basis, and our preliminary conclusions were reviewed by the Trade Policy Staff Committee, which includes all agencies concerned with international trade. While our review focused on the trade policy aspects of the situation, it included all relevant factors and thus our comments are framed within the broad context of the uranium issue.

Without a doubt, the domestic uranium mining and milling industry has severe economic problems, as you well know from your own review and viability determination. From their peak in the 1970's production and employment have fallen to very low levels. However, it would appear from our review that the principal cause of this decline is the failure of demand to materialize in the early 1980's as a number of nuclear power plants were delayed or cancelled. As a result, a huge excess inventory was created that could take up to ten years to work off, with a consequent depressing effect on market prices. On top of this, recent uranium discoveries in Canada indicate a long-term comparative advantage for their producers in terms of ore quality and production cost.

Against this background of the outlook for the next five to ten years, we evaluated the appropriateness and likely effectiveness of existing trade laws to help the U.S. industry and the trade policy implications of initiating action under these laws. The following is a summary of our preliminary assessment.

Section 201 of the Trade Act of 1974 is intended to provide temporary relief to domestic industries seriously injured, or threatened with serious injury, by increased imports. The relief provided (following an extensive investigation by the International Trade Commission and a review and decision by the President) is generally only for up to five years to allow the affected domestic industry time to adjust. There are two principal questions relative to this discussion: (1) Is self-initiation of Section 201 appropriate to the current situation? and (2) Should the special provisions of Section 170B of the Atomic Energy Act regarding self-initiation of a Section 201 investigation be invoked?

Regarding the first question, we would advise against self-initiation of a Section 201 investigation at this time for several reasons. First, it is unlikely that the International Trade Commission would find that the industry's problems are due more to imports than to any other single cause; significantly reduced demand appears to be the major factor. Second, since the industry's problems appear to be long term rather than temporary because of the fundamental comparative advantage of Canadian and Australian producers, we do not believe Section 201 is appropriate. Third, even if Section 201 relief were provided, it appears that its effects, while marginally improving the industry's position, would not be sufficient to make the domestic industry viable, especially in view of its limited duration and the substantial foreign advantage with respect to ore quality and production cost.

Regarding the second question, we would advise against your making a prior determination of the effect of imports on the domestic industry, even if self-initiation of a Section 201 investigation were appropriate, because of the complex legal issues which could result from a pre-investigation injury finding by an agency other than the ITC.

Section 232 of the Trade Expansion Act of 1962 provides relief where imports are found to be threatening our national security. Uranium for military uses is not an issue here, but only uranium for commercial electric generation. The principal source of imports is Canada, an immediate neighbor and a longtime stable ally. For this and other reasons, we do not believe it would be appropriate to self-initiate an investigation at this time.

We also examined the possibility of self-initiation of countervailing duty or antidumping investigations, based on various allegations of subsidies and dumping with regard to Canadian imports. From a preliminary and informal analysis of the available information, we do not believe such actions would be effective or appropriate. Our industry, of course, is free to file petitions of its own if it believes such actions are a cause of material injury. However, we feel the allegations are not such as to merit the exceptional step of self-initiation since, even accepting the allegations at face value, the resulting duties would not be sufficient to offset the cost advantage of Canadian producers.

With regard to the authority to restrict enrichment of foreign uranium under Section 161(v) of the Atomic Energy Act, it appears that a major consequence would be the shift of enrichment activity from U.S. government facilities to foreign facilities, thereby eroding the position of U.S. enrichment enterprises.

In summary, action under the U.S. trade statutes does not appear to be appropriate in regard to both the short and long-term problems facing the domestic uranium mining and milling industry. Moreover, any remedy granted under existing law which might provide the extent of relief requested by the industry would only be short term, while at the same time having an adverse impact on our trade and other relations with important trading partners without resolving the long-term problems of the industry. For example, we have just begun discussions with Canada on bilateral trade liberalization. Short-term actions adversely affecting Canadian trade would therefore be ill-advised, particularly if they did not lead to a permanent restoration of competitiveness for our industry. In addition, for any trade restriction not in response to a verified unfair trade practice, we would also owe compensation to, or face retaliation by, our other trading partners whose imports would be reduced. Thus, other sectors in the U.S. economy would be asked to make sacrifices for any short-term import relief provided for the uranium industry.

For these reasons, I would advise against taking any action at this time to restrict uranium imports under existing law. I hope these comments are responsive to your request. If you have any further questions, please give me a call.

Sincerely,

Clayton

Clayton Yeutter

cc: Ambassador Michael B. Smith
Ambassador Alan Woods

Senator Ford. Thank you, Mr. Rossin.

Mr. Merklein, let me ask you a couple of questions first, maybe three.

In the executive summary of the 1985 viability assessment, EIA states, and I quote from that assessment: "All current and expected short-term indicators of the domestic uranium industry's condition are weak in relation to those of recent times."

Do you believe that EIA will have a different assessment for 1986? If so, how will it be different? Better or worse?

Dr. Merklein. I would like to refer to Dr. Clark for that answer, sir.

Senator Ford. Be sure that you introduce yourself, sir, so that it will be entered into the record.

Dr. Clark. My name is Gene Clark. I am Director of EIA's Nuclear and Alternate Fuels Division. I am responsible within EIA for the analysis and data collection activities for the nuclear power and uranium industries.

We do not really have a good assessment of what 1986 looked like yet. We are just now collecting the information upon which we will base our 1986 viability assessment.

We expect that eventually the net losses on income in the industry are going to be mitigated somewhat because much of it is driven by write-downs of properties.

Senator Ford. Driven by what?

Dr. Clark. By write-downs of properties—taking them off the companies' books because they are nonproductive.

On the other hand, a lot of the positive income that is being generated is from old contracts with high floor prices. Those will expire.

So there are ups and downs that we can expect. But we really don't have an assessment yet of the magnitude or the direction of the assessment.

Senator Ford. I don't know to whom to address this next question but I will address it to the panel and one of you can grab it.

In your opinion, what are the main factors in the nonviability of the domestic uranium mining and milling industry? Also, you might say how many of these factors are subject to control by DOE.

Dr. Clark. We hate to express our own personal opinions about viability because we went through a public rule-making to try to establish criteria that we would use.

But if we refer back to the statement made by the Secretary of Energy on December 19, 1986, he referred to the industry's financial status and its incapability of maintaining production capacity through the 1990s. These factors were of most concern and, therefore, were primarily responsible for the nonviability determination.

Again, the losses, the huge losses of $307 million in 1984 and about $350 million in 1985, were very large factors, I believe.

Senator Ford. What about the production?

Dr. Clark. Production was quite a bit lower during 1985 than it was in 1984. We expect production to be somewhat higher in 1986.

Senator Ford. When you say "somewhat," are you a two-handed prognosticator? You know, that is on the one hand it might be X, and on the other hand it might be something else.

I would like to have a one-handed opinion, if I could.

Dr. CLARK. If I could count up on three hands, I can get to about 13 million pounds, which is about what we think production was for 1986, compared to 11.3 million for 1985.

Senator FORD. What about the pricing? We are getting into the pricing arena, and we are beginning to see our domestic industry move away and be depleted, or, basically, losing sales.

What is your projection, then, if you make the assessment, that we will virtually be out of business if we let it continue on the same path that it is on?

Dr. CLARK. Well, Mr. Chairman, our projection was for fairly level prices in constant dollar terms through the rest of this decade—below $20 a pound.

At below $20 a pound, there is not much U.S. industry that would be entering the market for new sales. There is some, but not much. There is not enough to make much increase in production, if any.

This would certainly be offset by the winding down of old contracts.

We do not expect prices to go to levels that would result in much of an increase in production until the 1990s.

Senator FORD. Would you not then have to limit imports to have any improvement in the domestic industry?

Dr. CLARK. Limiting imports would make a difference in prices, presumably, because that would withdraw a segment of supply from the market. But inventories are also a large factor, and we see inventories being 10 percent of the supply, even through the 1990s. That is a long-term problem.

Senator FORD. What, then, can EIA tell the subcommittee about the impact of reclamation costs on the uranium industry's economics?

Dr. CLARK. Mr. Chairman, we have not done any analyses of reclamation costs. We do not really have the expertise to cover that aspect of it. We do have some information reported from the uranium companies on how much money they set aside for it. But that may not reflect what the actual costs would be.

Senator FORD. Can you make some kind of study, some kind of projection, maybe left-field—and maybe not today, but could you give it to us for the record?

Senator DOMENICI. Do you mean the mixed mill tailings, Mr. Chairman?

Senator FORD. Right.

Senator DOMENICI. I think Mr. Rossin made that estimation of cost, didn't he?

Mr. VAUGHAN. Mr. Chairman, we do have an estimate of reclamation costs that we will be glad to talk to. I am not sure whether we are in a position to address exactly how that affects the economic balance sheets of each company, but we can talk to the estimate of reclamation costs.

Senator FORD. Can you talk to the large disparity, the difference between the two estimates, one being NRC's estimate and then your estimate? You lowered yours by about $2 billion today, from $4 billion to $2 billion, and the NRC's projection is about $270 million.

Mr. VAUGHAN. Do you want to move to that at this point? If you would like to, we can.

Senator FORD. Well, I don't mind. Since we are in it, let's just drive right on.

Mr. VAUGHAN. All right.

Let me start with the cost estimate that we provided in a very preliminary form in hearings in the past couple of years, the so-called $4 billion estimate.

We did a direct extrapolation in terms of dollars per pound, based on our experience in executing our Title I responsibilities under UMTRCA. If you simply take those numbers, they come out in the vicinity of $25 a ton, and multiplying it by the number of tons of Title II tailings, that is where you come up with the $4 billion number.

We subsequently looked at projections of economies of scale—that is, many of the active sites have larger numbers of pounds at a given site, so you should get economies of scale—and you look at the fact that most of the active sites are in more remote locations than the earlier Title I sites, so that the chances of having to move the tailings in order to conform with all the EPA regulations are small, and you can stabilize them in place. Then you can take a better shot at coming up with something in the vicinity of $10 a pound, on a weighted average—not for an individual site, but an overall, weighted average.

So that brings you down to the range of just under a couple of billion dollars.

Now, there are some factors that will lower the estimates closer to the billion dollar range, and part of those result from getting the Federal Government out of the business of managing it, because that adds a certain amount of overhead costs in terms of contractors to oversee the management. And taking the benefit of not having to redo a lot of the planning and conceptual design work that we have had to do as we have approached some of these things for the first time. And, further, if the Federal Government is not managing it, you are not obligated to utilize Davis-Bacon contracts, and so, you could probably take another 15 to 20 percent off. So you could probably save 30 percent to 40 percent by getting the Federal Government out of the business of managing it.

That takes you down closer to the billion dollar range.

We obviously have not precisely estimated the costs, but that is about as well as we can do it for you.

With respect to the NRC costs to which you referred, we have not studied those costs in a long time.

I know that the NRC did have some estimated costs when they were setting up the so-called escrow accounts for the Title II sites, and the numbers were extremely low, in the range of a few dollars a pound, based not on any experience at all at the time, probably not based on combating ground water conditions which have been heightened by some of the more recent increases in EPA requirements that we have had to meet, including, in some cases, digging out the piles and putting barriers under them to avoid ground water problems.

If you would like, we would be pleased to go back in more detail and look at those original NRC estimates and see if we can find what they were based on.

Senator **Ford**. Do you have those figures? If not, we can give to you——

Mr. **Vaughan**. If we don't have them, we can get the figures.

Senator **Ford** [continuing]. We can furnish to you what NRC gave us last year. If you could have your people analyze it and give us a comment on it, I think the committee would need that and would appreciate that effort.

Mr. **Vaughan**. We would be glad to do that.

I think the numbers they gave you last year, Mr. Chairman, were not necessarily current numbers. I know they gave them to you in a current, a recent year, but I don't think they were recently made estimates.

[The information follows:]

COST ANALYSIS FOR RECLAMATION OF TITLE II URANIUM PROCESSING SITES

The Department of Energy (DOE) cost estimate was prepared on the assumption that some comparability existed between the proposed Title II reclamation program and DOE's Title I cleanup program for inactive sites. Our estimate is based on 4 years of actual design and construction experience. Using actual Title I cost experience, an attempt was made to reasonably adjust DOE's cost experience to allow for possible differences between Title I and Title II sites.

Utilizing Title I experience and allowing for economies of scale and low probability of relocating tailings to other sites for disposal suggests that unit costs for reclamation at Title II sites would range from $5 to $10 per dry ton. Assuming 190 million tons of tailings, DOE estimates that the costs for stabilizing Title II sites could range from $1 to $2 billion. This rough estimate would not include costs for groundwater restoration and vicinity property remedial actions.

DOE has reviewed the July 1985 briefing paper prepared by the General Accounting Office for use by the House Interior and Insular Affairs Subcommittee on Energy and the Environment prior to conducting hearings on then-pending legislation (the Uranium Mill Tailings Reclamation Act of 1985). We have also communicated recently with Nuclear Regulatory Commission (NRC) staff members on the current surety arrangements the NRC and agreement states have in place for reclamation at Title II sites. The current NRC staff estimate for Title II sites is on the order of $210 million, largely based on preliminary reclamation cost estimates prepared by the licensees as part of their site reclamation plan. The licensees' reclamation estimate is for construction only and does not include cost for such items as engineering, site and tailings characterization, environmental impact analysis, and project and construction management. These items are included in the Department's estimate whereas we understand the licensees include these costs as part of their on-going site operating cost and not part of the site reclamation cost.

The NRC is in the process of reviewing the reclamation plans to ensure the plans meet Environmental Protection Agency standards for the 86 million tons of tailings located in New Mexico. This represents approximately one-half of the total volume of Title II tailings to be stabilized. In 1986, the State requested the NRC to assume regulatory authority for the sites. Previously, the reclamation plans and costs were based on meeting State standards. It is reasonable to assume that the reclamation plans for the New Mexico sites will be revised and this may lead to an increase in the surety requirements. Updated surety arrangements at a majority of the sites should exist in about 1 year.

Reclamation plans for the Title II sites, as a result of several years of on-going operations, surveillance and maintenance, consist primarily of re-arrangement or re-contouring of the tailings piles followed by placing a radon gas and erosion barrier. Construction activities for Title II sites is generally not as extensive as for the inactive Title I sites the Department of Energy is responsible for.

Finally, actual reclamation experience on Title II sites is very limited. The Edgemont site is currently being remediated and the tailings relocated about 2 miles from the site. We understand that reclamation at this site is about $10 per dry ton. Later this year a detailed estimate is to be prepared for the Uravan site.

In conclusion, it is our expectation that the disparity between the Department's cost estimate and the surety arrangements would be significantly reduced after: (1) an allowance is made for differences between the scopes of work included in the estimates prepared by the two agencies; (2) the New Mexico sites have NRC-approved reclamation plans; and (3) allowances are made for differences on construction complexity between the Title I and Title II sites.

Senator **Ford**. Mr. Rossin, do you believe that the loss of a domestic uranium industry is likely?

Dr. **Rossin**. Mr. Chairman, I cannot really make a prediction. But my major concern is the importance of that industry ties with our ability in nuclear power to deliver electricity to this country. And, of course, our hope that at some time in the foreseeable future, utilities would, once again, order nuclear power plants.

But there is no real way that I can see, even with our best scenarios, that new nuclear power plants would come on line more than a couple of years before the turn of the century.

So we know how many plants remain to be completed, and we can project pretty well what the overall demand will be.

Senator **Ford**. Can you add nuclear weaponry to that also? You just went to energy, and I think we have nuclear weaponry also that has to be involved in that, too, don't we?

Dr. **Rossin**. Absolutely.

Those projections can be made and have been made, and we can supply them.

[The information follows:]

PROJECTED LONG TERM SEPARATIVE WORK SALES*

Fiscal Year	Millions of SWU		
	Civilian	Government	Total
1987	9.4	2.1**	11.5
1988	10.6	1.9	12.5
1989	9.7	6.1	15.8
1990	10.9	5.7	16.6
1991	10.9	5.1	16.0
1992	11.7	5.6	17.3
1993	12.6	5.1	17.7
1994	13.6	3.3	16.9
1995	13.0	2.2	15.2
1996	12.8	2.1	14.9
1997	12.4	1.0	13.4
1998	13.4	1.2	14.6
1999	14.7	1.4	16.1
2000	13.6	1.2	14.8

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*From the January 1987 Uranium Enrichment Operating Plan (based on anticipated future transaction tails assays).

**Based on FY 1987 column of FY 1988 Congressional budget.

Dr. **Rossin**. The real question is how long it will be before we can see an increase in the future in the demand because of new plants.

Senator **Ford**. Is there anything we should be doing about the current situation of the industry? Is there something we should be doing right now?

We need your advice because we are getting ready to do something.

Dr. **Rossin**. We have promised to provide the Congress by the end of March with a report that follows an interim report that was submitted on February 17, with our recommendations for things we can do with regard to the uranium enrichment program.

We will provide that report, and we look forward to working with you and others in the Congress on how we can make this whole nuclear power system, and the uranium enrichment enterprise in particular, more viable.

Senator **Ford**. Mr. Rossin, how many SWUs, separative work units, are in the DOE inventory?

Dr. **Rossin**. Mr. Vaughan has those numbers.

Mr. **Vaughan**. I think I have some rough data here, Mr. Chairman, that might help.

At the end of 1986, there were about 18.5 million SWUs of enriched uranium; at the end of 1987, a little over 12 million.

Senator **Ford**. Is that your estimate for 1987?

Mr. **Vaughan**. Yes, that is the projected estimate.

Senator **Ford**. How many was it at the end of 1986?

Mr. **Vaughan**. At the end of 1986, there were about 18.5 million.

Senator **Ford**. All right. And at the end of 1987?

Mr. **Vaughan**. At the end of 1987, it is projecting to be a little over 12 million. At the end of 1988, we are projected to be at about 4 million.

Now, 4 million SWV's reflects the so-called 120-day working inventory below which we cannot and should not drop, as a matter of contingency in case of an interruption in the plant. We would not drop below that number.

What you are seeing here is the fact that, with a number of very high overhead costs such as those imposed by the TVA demand charge and number of other factors, we have decreased our production costs last year and this year, and are balancing production costs, that is, making fewer SWUs than we sell, and selling down the available enriched inventory.

We will no longer be able to do that past the end of 1988 because we need to keep the minimum working inventory.

Senator **Ford**. How many SWUs will be manufactured this year and next year?

Mr. **Vaughan**. Let's see—this year being Fiscal 1987, we estimate producing, that is, manufacturing about 6.3 million; and in 1988, we would project manufacturing somewhere between 4 million and 4.5 million SWUs.

Senator **Ford**. That is through 1988. Then, at the end of 1988, you would have to do what?

Mr. **Vaughan**. At the end of 1988, we would have to return to a position where we make all we can sell, which would be between 10 million and 13 million SWUs per year.

Senator FORD. What is your projection of the price of ore after 1988?

Mr. VAUGHAN. The price of ore after 1988? I don't have a specific estimate of that.

Mr. Clark might. But that, per se, would not affect the uranium enrichment prices because the inventory that I am describing to you is the inventory of enriched uranium.

Senator FORD. But you would have more demand for ore then than you would now, wouldn't you, because you are reducing the output and then you are levelling off?

Mr. VAUGHAN. I think this is important for us to understand, if we can take a minute to clarify between the two inventories we are talking about.

We require our utility customers to bring to us feed material, natural uranium, equivalent to that amount we enrich and deliver as enriched product. That requirement is constant throughout this whole discussion.

So, the inventory we have been selling off is our existing inventory of enriched uranium. But we have not changed the requirement that our utility customers bring to us and deliver to us feed material for enrichment equal to that which goes out the door.

And so, what we have at this point is a larger inventory of natural uranium ready for processing and a decreased inventory of enriched uranium.

Dr. ROSSIN. Mr. Chairman, may I add to that.

Senator FORD. Mr. Rossin.

Dr. ROSSIN. The Department does not buy the uranium feed. The utilities buy that from the producers, and the DOE receives pounds, or tons, of that material.

So the price that the utility pays is not really reflected in DOE's books. But, obviously, that price becomes an element of the utility's costs in buying fuel and supplying that fuel.

Senator FORD. It also becomes important as it relates to the domestic operation. Also, the price to the utility user is an important factor.

Mr. Clark, were you able to make a determination there quickly about the price of ore after 1988?

Dr. CLARK. Yes, sir.

We have a projection in our viability assessment report, and it typically shows the prices in the 1990s rising to the mid-$20s a pound, in constant dollars, in 1985 dollars, and pretty much flat, maybe inching up toward $30 a pound by the end of the century.

That is our independent projection of what the prices would be.

Senator FORD. Well, let me ask you this, Mr. Rossin. How much, if any, of this uranium is from South Africa?

Dr. ROSSIN. We have some figures on that, and, once again, I am going to turn to Mr. Vaughan.

Mr. VAUGHAN. Let me use some different terms of reference, because I have them in my head. Then, if you want it more precisely, I will give it to you for the record.

Let me separate it into two parts.

Our projected SWU sales through 1992 would have about 20 percent of South African origin material—and that would all be from foreign utilities not domestic utilities. We enrich it here and return it to them for burning in their reactors after fabricating it into fuel. The actual sales to those foreign customers is about a third [or 30 percent] of our total.

What I am trying to convey is those foreign customers who currently plan on buying South African uranium represent about 30 percent of the business, but the total amount that comes from South Africa is about 20 percent of our total business. They have diverse sources of supply. About two-thirds of their supply is from South Africa.

If they took all of their enrichment requirements away because of not being able to bring that material in under the ban imposed by the Comprehensive Anti-apartheid Act which, as you well know, is yet to be finally interpreted, it would be a significant sales loss.

Senator FORD. I have taken too long. I have some other questions, but I want to hold off here for now.

Senator Domenici.

Senator DOMENICI. Thank you very much, Mr. Chairman.

I am particularly pleased that the Chairman of the full committee is here, and I want to thank you both for having this hearing.

Let me say that I was going to ask you to yield at one point, Mr. Chairman, when you said what could we do, asking them (indicating).

I regret to tell you that the answer is very, very simple. It is none of the hogwash they have been talking about, none of it. They just ought to comply with the law of the land, plain and simple.

The law is eminently clear. They know it, and every time they are confronted with it, they send it off to the Trade Representative of the United States.

Senator FORD. Maybe we ought to have him here, too, as a witness.

Senator DOMENICI. We ought to have him here. Then the Trade Representative of the United States hems and haws around and he does nothing.

There is nothing in the American law that requires when there is a uranium industry that is not viable, there is nothing that talks about our trade laws having to find unfair trade.

On the other hand, there is unfair trade going on between Canada and America. But the law is very simple: if you have a nonviable domestic uranium industry, the United States Government is supposed to do something about it. It does not say that they are supposed to give us a study in six months or a report. It says they are supposed to do something about it.

The fact of the matter is they don't want to—just plain and simple. They don't want to.

They have this notion that that law could not have meant that. And, as a matter of fact, they are now talking about 1991, maybe we will have enough, maybe 2000. Well, that is not what the law says.

It says it is the responsibility of the United States Government to see to it that we have a uranium industry.

Now, what they could do, which would be far better than any of them have done—and I am not blaming this four; I am blaming the United States Government—they could send us up an amendment to the law of the land and say we'd like to be honest, we don't want to comply with this law, we don't think it is a good law, if that is what they think, and we ought to change it.

They do not do that either.

They fool around here and there. They refer it over to the Trade Representative, and he takes a look, and he says Canada is not unfairly competing. That is the number one issue.

Now, you all do not like what I am saying, and some of you are my good friends. Some of you might even be frowning, and you know that I am fair. I will not talk too long. And then you all can tell the Chairman if I am mistaken.

A District Court Judge told you that unequivocally. There it is, he said, in the statute. How could it be more clear? It is on appeal.

We are just hoping that that Circuit Court will say it cannot be any more clear and you have to do something about it.

You all know what he did at the District Court level. It is very interesting. He said you have to stop importing uranium. You cannot import any, was his decision.

I am not suggesting that the United States ought to do that. That is pretty onerous at this late date. But, I guarantee you, if there are any grounds for you all to make a deal with Congress to fix things, this Senator is going to be an awful lot more difficult to get along with when that Circuit Court affirms that opinion and says you have to stop importing.

So, my first suggestion to you is that you all ought to sit down and figure out some way to resolve this issue in some kind of fairness under a statute that has existed for a number of years.

That is number one.

Number two, mill tailings cleanup. Here there is some more gobbledigoop. "Commingled mill tailings"—everybody knows what that is, don't we? We call it that because part of it is from the old Atomic Energy mandate and part is current operational activities that you can separate out.

One-third of the existing mill tailings by your estimates are exactly the same kind of mill tailings as the Title I mill tailings, which we have assumed full responsibility for. This committee passed a law saying Title I, those were mill tailings, dead tailings that were required by action of the United States Congress under the Atomic Energy Act, and what did we say? We said: Federal Government, you clean those up. You pay for them.

Now, how in the world can you come before us and say the companies ought to clean up the commingled tailings when one-third of them are the same as the ones the Federal Government assumed responsibility for eight years ago? Would you just answer that one kind of quickly, with a few words?

Mr. **VAUGHAN**. Senator Domenici, let me answer since we have had this discussion several times.

First of all, it is a fact that about 29 percent of the tailings at active sites, which is close enough to a third for this discussion, do come from former work for the Atomic Energy Commission. We resurveyed that again this spring, and reconfirmed that number.

Our statements on Federal responsibility are based on the way Congress passed the act in 1978. When Congress enacted Title II they indicated cleanup was a responsibility of the owners, and that they were supposed to be setting money aside for it.

Now, if Congress were to revise the law, then we would have to look at some fair portion.

Senator **Domenici**. Well, I do not understand the law to have said that. But can we get on the record that if the cost is $1 billion, which is what we all estimated last year for the comingled pilings, and if one-third of them are the same as Title I, and if this Congress were to say if Title I responsibility is Federal, so is some portion of the commingled, the arithmetic is pretty simple—it is about one-third. Is that right? About 29 percent?

Mr. **Vaughan**. Yes, 29 percent.

Senator **Domenici**. So, if it is $1 billion, if we were trying to put something together, it is not unreasonable to say the Feds ought to pay $300 million of a $1 billion tab. Is that at least a rationale that is logical?

Mr. **Vaughan**. That is an accurate statement of the math. [General laughter.]

Senator **Domenici**. Now, the cost of the cleanup, you said $4 billion. Last year, we gave you an estimate of $1 billion. You are coming down. Now you are down to $1 billion to $2 billion.

Mr. **Vaughan**. Well, I tried to explain in response to the Chairman's question the differences between the way those two numbers were calculated. The first calculation was based on a direct extrapolation, which we identified at the time, plus a fair amount of Federal Government overhead, and then I tried to explain how if you took the economies of scale and reduced some of the Federal Government overhead you could be more reasonable.

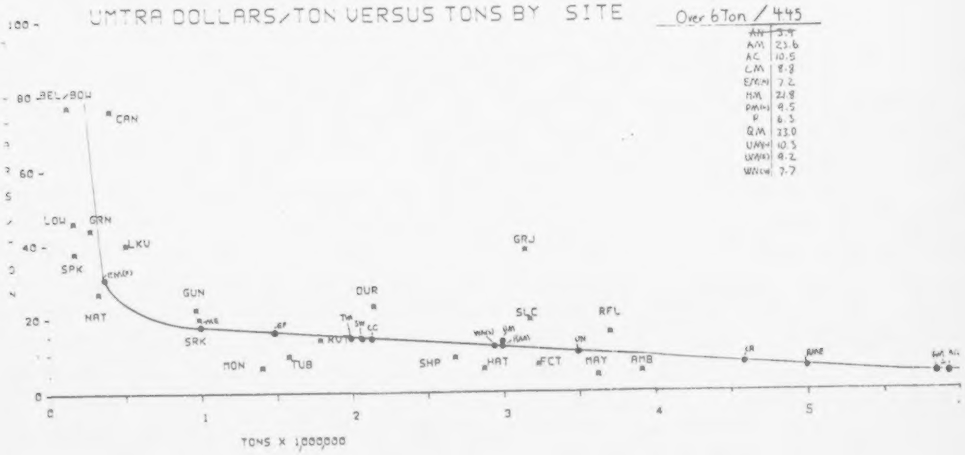
Senator **Domenici**. I understand.

One of the reasons that I am going to put into the record this exhibit is that the pilings that we cleaned up under Title I are small, and you used the average of the small ones, and the ones that are going to be cleaned up under commingling are very, very large, and, consequently, you are going to get extreme savings. That was the chart that we tried to convince you with last year, that the $4 billion is outlandish.

We would like to make it a part of the record at this point.

Senator **Ford**. It is so ordered.

[The information follows:]



Mr. VAUGHAN. Senator Domenici, we did not disagree with you last year. We indicated that we would go back and take a more careful look at it and we indeed did that.

Senator DOMENICI. All right.

I only have three or four more questions and I will be quick, Mr. Chairman.

Now, none of you has represented a mining State that lost 7,500 miners who were mining uranium six or seven years ago, and we have I think 142 now—have you?

[No response]

Senator DOMENICI. I didn't think so.

Senator FORD. That's a good campaign issue.

Senator DOMENICI. Then I do not believe any of you has had the experience of having a mining engineer from one of those mining companies that used to hire many of those people tell you the following story. You listen to it and you tell me that we are not being treated unfairly by Canada in some way, or Canada is not treating their uranium producers in some special way.

[DOE supplied the following:]

SALES OF ENRICHMENT SERVICES TO COMMERCIAL AND GOVERNMENT CUSTOMERS (FY 1969 THROUGH FY 1986)

	Commercial				Percent
FY	Sales	Licensee	Gov't	Total	Commercial
1969	1,328	607	2,142	4,077	47.46
1970	2,688	3,189	-915 1/	4,962	118.44
1971	6,990	2,648	-755 1/	8,883	108.50
1972	5,166	2,335	-2,082 1/	5,419	138.42
1973	7,656	1,844	-1,323 1/	8,177	116.18
1974	12,203	1,662	-1,424 1/	12,441	111.45
1975	6,588	629	-207 1/	7,010	102.95
1976	9,448	260	442	10,150	95.65
1977	9,099		1,422	10,521	86.48
1978	11,234		1,174	12,408	90.54
1979	13,922		871	14,793	94.11
1980	9,995		820	10,815	92.42
1981	10,480		1,360	11,840	88.51
1982	13,698		1,537	15,235	89.91
1983	13,798		1,277	15,075	91.53
1984	10,778		1,560	12,338	87.36
1985	11,451		1,447	12,898	88.78
1986	9,769		1,820	11,589	84.30
TOTAL	166,291	13,174	9,166	188,631	
	88.16%	6.98%	4.86%	100.00%	

1/ Return of material exceeded deliveries.

Senator DOMENICI. A new mining engineer, assigned the job of taking over a mine in New Mexico, an excellent, excellent engineer—he is not expert in uranium, so he decided to take three months and learn about it. He has plenty learned it now. He went off to see what was cooking in Canada.

Have you ever heard of Elliott Lake in Canada, any of you?

Dr. CLARK. [Nods affirmatively.]

Dr. MERKLEIN. [Nods affirmatively.]

Dr. ROSSIN. [Nods affirmatively.]

Senator DOMENICI. I see that you have.

Guess what he found at Elliott Lake: full employment and 100 percent mining. I stopped him and said well, of course, it must be an extremely rich deposit. You know his answer, don't you, Mr. Clark?

Dr. CLARK. He said it was not a rich deposit, sir.

Senator DOMENICI. He said it's not a rich deposit. As a matter of fact, he said it is not any richer than many of those in New Mexico and Wyoming that people have been talking about as being not rich enough to compete with the Canadian mining.

Do you think this Senator felt very good when I said, well, how could that be when the Canadians don't subsidize anybody, they don't guarantee any contracts, as the U.S. Department of Commerce says when we ask them on this. My engineering friend says that can't be so; they are all working because they have a guaranteed price for their uranium.

From whom do you think they got that? Do you know, Mr. Clark?

Dr. CLARK. My guess would be the Ontario Hydro-Utility Co.

Senator DOMENICI. That's correct. And who are they?

Dr. CLARK. Well, I don't know the full details except that they are a government-owned utility.

Senator DOMENICI. A state-owned utility.

So, the state-owned utility is the one assuring them that they can stay in business, mine uranium from mines no better than ours, at no higher costs to produce it, and yet, their government is not involved in any way in subsidizing their industry?

Does that sound logical to you?

Dr. CLARK. Senator Domenici, we were given information by the uranium industry about the prices that were being paid by Ontario Hydro and the conditions thereof.

We had to work only from the public record because we had no access to internal company records. We could not really establish whether there was or was not a subsidy involved.

We noted that those contracts were signed in the 1978–1979 timeframe, when the price of uranium was up around $43 a pound.

We have several utilities in the United States that signed contracts in the same timeframe that are paying comparable prices to U.S. uranium companies.

I would have to have been a fly on the wall when the contracts were signed, but I cannot really say, on the basis of the information that we have, whether there is or is not a subsidy involved.

Senator DOMENICI. Well, don't they do something else?

Don't they force their uranium mills to ship their U308 to the Ontario Conversion Facility to convert it to gas, to UF6, thus limiting at least two of our companies that do that?

Isn't that a way of having Allied and Kerr-McGee unavailable to make the conversion?

Dr. CLARK. I am just not familiar enough with the details of that. I understand there is some discussion with Canada about their policies on the upgrading, but I am just not privy to the information about that.

Senator DOMENICI. Well, I ask any of you if you happened to read David Heglin's article, "Protectionalism and National Security in Canada." Has any of you happened to read that?

None of you?

It is good reading. He is a Canadian. All of the things I have told you here, plus quotes like this: "It is no secret that the Canadian uranium is selling in the United States at prices lower, often far lower, than prices Canadian uranium sells at home. Saskatchewan producers sell in foreign markets at prices lower, to be sure, than those Ontario producers are fortunate to command from Canadian consumers. Ontario Hydro is paying its long-term suppliers what amounts to a premium of more than 100 percent."

We have a Canadian saying that about Canada.

But I gather all you do is give the facts that you can find to the Trade Ambassador, and then it is up to him. Is that what I am hearing?

Mr. VAUGHAN. I think, Senator Domenici, there is another aspect to this, if I understand it correctly. And that is that if the uranium mining and milling companies feel that there are unfair trade practices, there is a procedure by which they can bring that to the attention of the U.S. Trade Rep——

Senator DOMENICI. Oh, I understand.

Mr. VAUGHAN [continuing]. To the Trade Representative, and you know that as well as I do, and ask for relief. The Department of Energy has not felt compelled to initiate that, but, rather, if the miners felt it necessary to let them initiate it.

Senator DOMENICI. I understand that.

I will submit two other questions that are technical in nature and will thank the Chairman for yielding.

Senator FORD. Senator Johnston.

The CHAIRMAN. Thank you, Mr. Chairman.

Mr. Rossin, we do not mine any uranium in Louisiana, but I would like to learn more about it and about the industry.

My first question is: Is uranium mining much like VCRs or Mardi Gras beads or shoes, that is, that it is not particularly important to national security so that we could, if we wanted to, rely upon cheaper sources and let the invisible hand determine where the comparative advantage is?

Is uranium of that nature? If not, why not?

Dr. ROSSIN. That is a difficult and complicated question, Senator.

I think uranium is important and it does not really quite compare with the examples you gave.

One of the variables is this inventory stockpile that exists in the ownership of utilities of this country, and exists in part in ownership of DOE.

Perhaps that is a little bit like a Strategic Petroleum Reserve in that we now have several years' worth of supply available in case there were some sort of cutoff.

The other question was taken up in discussion of the viability of the American uranium——

The CHAIRMAN. I'm not talking about its viability. I say is it important to have one. If so, why is it important to have a domestic uranium industry?

Dr. ROSSIN. Well, I think it is important.

The CHAIRMAN. Why?

Dr. ROSSIN. It is important for supply of the fuel we need for our nuclear power industry. But, at the same time, to a certain degree, diversity of supply is a valuable thing, especially if it means lower-cost electricity to the American consumer.

The CHAIRMAN. Why would it be bad to be relying upon Canada, or Australia, wherever? Why is that bad? Or is it bad?

Dr. ROSSIN. Well, it really is not bad. It is justifiable in terms of diversity and lower cost.

The CHAIRMAN. So, if our present policy would put the domestic uranium business out of business, in spite of the fact that we do not like to lose 6,500 jobs in New Mexico, as a national security problem that is no problem—is that what you are saying?

Dr. ROSSIN. That is different than what I said.

I talked about diversity. I do not like to see the demise of an American industry, either. I think it would be very valuable if that industry remained in existence. I think we have been told that there are mines that could expand or reopen if the demand were there.

The CHAIRMAN. Now, if you lose that industry, how long would it take to recreate the industry if we needed it? We have this problem with oil and gas, and I have been saying that if we shut down the domestic oil and gas industry and then the Saudi Arabians or OPEC raises the price four times over, as they did last time, and we then call upon the domestic industry, it would take years to recreate the capabilities in all of their facets.

Now, is that so with uranium, or can you recreate that capability reasonably fast?

Dr. ROSSIN. I really do not know enough about the specific circumstances. I am sure there are great differences in different States and different mines and different companies.

It is a very complicated question for me to try to answer. If any of the other members of the panel could help, I would appreciate that.

But it is something for which we could try to put together an analysis for the record. But I am sure that a simple yes or no is not going to be a fair answer.

The CHAIRMAN. We have not made a study, then, on how long it would take to recreate the industry?

Mr. VAUGHAN. Senator Johnston, I do not think we have made a precise study. I think that it is clearly in terms of years—at least five—and that is a personal opinion and is not based on a study.

The CHAIRMAN. It would take five years to recreate it?

Mr. VAUGHAN. At least, I would guess—and that is a personal opinion.

Let me clarify just a couple of things, if I may, because when people talk about national security, there are two aspects.

From the point of view of national security for our military needs, there is a sufficient stockpile available and segregated—different from that which we have been talking about today for commercial customers—to take us through at least the year 2000, and probably beyond, based on the various scenarios that you look at or the needs for military production. If you equate energy security with national security, which I think both you and I do in a certain sense, then you are into the question of how much do we depend on our friendly nations, such as Canada and Australia to be able to supply those needs, and it becomes simply a tradeoff of economics versus indigenous supply.

The **Chairman**. Well, let's say we do shut down our domestic industry and we are in that five year window. How secure—not so much how secure, but how price secure would be reliance upon Canada and Australia? Those are the two main ones. What are the diversities of supply?

Mr. **Vaughan**. Well, those are the two principal sources.

The **Chairman**. And they are great friends of ours, but I doubt if they are good enough friends not to raise the price.

Mr. **Vaughan**. Well, a number of these utilities have long-term supply contracts. I cannot personally cite the price guarantees that are there. But a number of them do have long-term contracts.

The **Chairman**. How long would that be?

Mr. **Vaughan**. I don't know.

The **Chairman**. At a guaranteed price?

Mr. **Vaughan**. I am guessing possibly on the order of five to ten years, price guaranteed.

The **Chairman**. At a guaranteed price.

Mr. **Vaughan**. That would be typical of some of the other guarantees in this business.

Senator **Domenici**. Bennett, excuse me, they did have a great cartel in the 1970s, which was better than anything OPEC ever had.

The **Chairman**. Are you telling us that cartel would not be recreated?

Mr. **Vaughan**. I obviously cannot comment on that.

The **Chairman**. Mr. Merklein?

Dr. **Merklein**. I just want to support what my political brethren on my, not ideological but my physical, left are saying.

Senator **Ford**. Would you repeat that? I didn't catch all of that. [General laughter.]

Dr. **Merklein**. Let me reiterate that Mr. Vanghan represents our policy shop as opposed to EIA, which is a data-gathering shop—EIA does not engage in policy making, of course.

But, to confirm what Mr. Vaughan has said, between the years 1954 and 1959, the amount of uranium concentrate production went from zero to about 32 million pounds. That is a pretty good indication of the industry's ability. That is approximately as high as it ever was, with the exception possibly of 1979–1980.

Now, this does not involve the question of what price or production subsidies there were, if any. This is just a physical construct, and represents what took place in history under this unique set of circumstances.

The **Chairman**. Well, if we enforced the law, as Senator Domenici would suggest, and restricted imports, obviously, it would raise the price. Do you have an idea of how much you would have to raise the price in order to have a viable industry?

I know that is not the only factor. I know you are over-supplied and the so-called lower grade of American uranium is thought to be a problem, by some at least.

Could we make a viable industry if we raised the price?

Dr. **Merklein**. Well, we, at EIA, have not looked at that and could not even answer it.

The **Chairman**. Mr. Rossin, what do you say?

Dr. **Rossin**. I don't know, Senator. I really do not know.

Mr. **Vaughan**. And I do not know, either.

The **Chairman**. Now, I am not an expert in uranium, but it looks to me like if you have a commodity that is being mined and you raise the price, that saves the industry.

Dr. **Rossin**. In principle, I would agree. But your question was how much would you have to raise the price, and I don't know.

The **Chairman**. Oh, I see.

Mr. **Vaughan**. You asked earlier, Senator Johnston, Senator Ford, and Senator Domenici, what things were there that you could do to help. I frankly think the biggest thing is beyond the subject of uranium supply or uranium enrichment. We all know it well, and that is whatever actions could be taken that will allow the whole nuclear power industry to again compete on its economic and technical merits, such as reforming the licensing process to make it more reasonable and some of the other institutional actions that would help revitalize the nuclear power option in the country, are also positive things to help the uranium industry because, in the long term, the biggest factor that has caused the decline of the domestic uranium industry has been the overprediction of demand, the overproduction, and the fact that the demand for nuclear power in this country has declined to where it is through a number of institutional issues, that we all know and that are important to all of us, but are not really the subject of today's hearing.

The **Chairman**. Well, it seems to me that this issue is very much like the imported oil issue. I might tell you that I am for an oil import fee. What I do in my mind, the logic of it is, say, a $5 oil import fee would bring the price of oil up and give it enough stability that people could drill and therefore could save the industry. That translates into 10 cents or 12 cents a gallon.

My argument, and I think it is irrefutable, is that it is pennies now or dollars later; that is, if you want to save the industry, you can do so with pennies now, or, if you wait until the industry is destroyed, then it is going to be dollars later, when you let the cartel get hold.

Now, my question is with respect to uranium, can you raise the price a reasonable amount, which the consumer can afford, in order to save an industry so as to prevent the cartel from having that economic power later?

It seems to me those are the kinds of things we have to balance—the amount of price increase, the value of the industry, the threat of the cartel.

Is that the right approach, or is there something that I am missing here?

Mr. VAUGHAN. I think that is a logical approach, and I do not have the numbers at my fingertips, but the fuel cost in terms of the total overall costs for nuclear power are a small enough fraction of the total costs that some formula, such as you suggest, probably could be absorbed by the consumer.

The CHAIRMAN. I would be interested to hear from my friends in the nuclear industry on this.

Dr. CLARK. I would like to add a little information here. At EIA, we have an annual survey of the uranium producers in which we ask them if the price were a certain number of dollars a pound, how much more would they have available for sale above their current contracts. They have reported that, in constant dollars, at $20 per pound, there would be almost nothing additional available for sale. Remember that the current spot price is about $17 a pound. So it would have to be above today's spot price to get maybe a million pounds of additional annuals sales out.

If the price were $30 per pound, the industry tells us they could produce up to 15 million more pounds per year and make it available for sale.

The CHAIRMAN. Was that $30?

Dr. CLARK. At $30 per pound.

At $40 per pound, they could bring it to as high as 23 million pounds per year in the 1990s.

The CHAIRMAN. And if it stays where it is, what happens to the industry? Did you ask them that question?

Is the answer to that that the industry shuts down?

Dr. CLARK. Well, we did not ask them that specific question, but many of them are coasting through on their current contracts. Based on our own projections that have the price below $20 a pound through the rest of this decade and then, in the mid $20's, at that level we have about 10 million pounds per year of U.S. production out in the 1990s.

The CHAIRMAN. Do they shut down in that event, Peter? At today's prices, we would just shut down the industry?

Senator DOMENICI. Yes.

What they have done to some very major, major expenditure items, they have tried to keep the mines, in response to your question of a while ago, how long does it take them to open, well, some are gigantic, where they went down during the high price just like during the high price of oil, and they built huge facilities. They have not yet, as of now, literally abandoned them. They are still spending some money, trying to keep them open.

But there is no mining going on unless it is under these long-term contracts, where they are paying them out. As a matter of fact, for the first time in history—and we were 85 percent of the supply for at least 15 or 20 years—there is not an operating mine in the sense of new activity in the State of New Mexico today.

Mr. Chairman, I also want to tell you with reference to defense—and I know we have stockpiles and the like—that there is an interesting phenomenon. The two suppliers of uranium to the United States are not necessarily suppliers of uranium for military use. As a matter of fact, Canada cannot sell us uranium for military use, and the Australians, if you recall, were hell-bent to develop more and more mines, starting about four or five years ago, and as a plank in their party, the party that took over control of their government, it had an anti-mining of uranium plank because it contributed to the supply of uranium in the world that supplied nuclear energy and, possibly, bombs.

They had an enormous political argument, and I think, as a result, they are still in the business and tough competitors, but they have dramatically restrained because of that political position of not being for mining uranium which might ultimately be used for military purposes.

And those are the two principal suppliers.

Mr. VAUGHAN. Senator Domenici is absolutely correct. If I implied that Canada was a source of uranium for military needs, I did not mean to imply that. I think that was in the part of the discussion where we were talking about energy security being a part of national security, as contrasted to military needs.

So, Senator Domenici is absolutely correct with respect to the Canadian policy.

The CHAIRMAN. Let me ask you this.

Where is the decision on this question of foreign imports? At what level is that made?

Is that made by the Secretary?

Mr. VAUGHAN. Yes.

The CHAIRMAN. Well, I know formally it is. But do you know whether that comes down from the White House or whether the Secretary can make it? Do you know the answer to that question?

I mean, I can tell you on an oil import fee. That comes right out of the Oval Office. But at what level does this come from, do we know?

Mr. VAUGHAN. I honestly do not know. I know that the Secretary makes the decision. He is interpreting, the Department is interpreting the law, as we understand it. We do have a different view than Senator Domenici. That is not a new difference—it is the same difference we have had for several years because we read the law as making certain requirements affecting imports for uranium enrichment applicable only to the extent that it would assure a viable industry, and we don't think changing the pattern right now would assure a viable industry.

We think what would happen in the near-term is that the utilities would go overseas for both their uranium purchases and their enrichment service needs, and we would have not only a decline in domestic mining sales, but in the U.S.'s ability to furnish enrichment services.

It might drive the uranium enrichment business nonviable, as well as the mining industry, because the utilities are free to do that.

We believe that is what would happen.

The CHAIRMAN. Thank you, Mr. Chairman.

Senator FORD. I have several questions which I will submit to the witnesses in writing and will ask for a timely response.

But I have just a couple of quick ones for now.

Mr. Vaughan, you said earlier on, I think, that you have a military reserve that would go to the year 2000.

Mr. **Vaughan**. Yes.

Senator **Ford**. Then you separated that into domestic use or reserve that would probably carry us through 1988, and then we would have a 120 day use level at that point.

Mr. **Vaughan**. Excuse me. Let me clarify that point.

Early in the testimony, we talked about inventories, and you asked me for some numbers on how much inventory is left at the end of 1987 and 1988.

Senator **Ford**. Yes, sir, and you separated out military.

Mr. **Vaughan**. The numbers that I gave you represented only the inventories available for commercial civilian sales. They did not include the inventory that is set aside for military use.

Senator **Ford**. You kind of passed over that a little bit, saying there was 2000, and then you jumped back for the year 2000 military.

Mr. **Vaughan**. That is a separate amount of inventory that was not included in the numbers I gave you. In the numbers I gave you, I was responding for commercial sales.

Senator **Ford**. Fine.

Senator Domenici is convinced, as are a lot of other people, that in the courts you are going to lose your case. Then we will have to pass a piece of legislation. And then you will be for one, too, won't you?

Mr. **Vaughan**. I'll be for one what?

Senator **Ford**. For a piece of legislation. You would get on board with us a little bit then, wouldn't you?

Mr. **Vaughan**. We will be perfectly happy, Mr. Chairman——

Senator **Ford**. Well, now, I don't want you to be "perfectly" happy. [General laughter.]

Senator **Ford**. Then we wouldn't have any fun here at all.

Mr. **Vaughan**. As we indicated last year, when we testified here and when you and Senator Domenici were in different chairs——

Senator **Ford**. But we are still in the same positions. [General laughter.]

Mr. **Vaughan** [continuing]. We would be pleased to work with you in providing any data, information, or whatever, with respect to some legislation to help solve this total problem. It is a problem, along with the rest of the uranium enrichment enterprise, that does need some work with the Department and Congress together to achieve a more rational set of circumstances than we have right now.

Senator **Ford**. Well, I thank all of you for being here today and look forward to visiting with you again and working with you on a reasonable solution. I hope that these questions that will be submitted to both parties would be answered in a timely manner.

Thank you all very much.

Senator **Domenici**. Thank you very much.

Senator **Ford**. Next we will have Edward Davis, President of the American Nuclear Energy Council, and Thomas Kuhn, Executive Vice President, Edison Electric Institute.

Mr. Davis, we will hear from you first. You might announce those who are accompanying you. Then we will get to Mr. Kuhn.

Did I pronounce that right?

Mr. Kuhn. Yes, sir.

Senator Ford. Very good. We will go from there.

STATEMENT OF EDWARD M. DAVIS, PRESIDENT, AMERICAN NUCLEAR ENERGY COUNCIL, ACCOMPANIED BY THOMAS J. PRICE, VICE PRESIDENT AND GENERAL COUNSEL

Mr. Davis. Thank you, Mr. Chairman and Members of the subcommittee.

I am pleased to appear before you today to testify on domestic uranium mining.

My name is Edward M. Davis. I am the President of the American Nuclear Energy Council.

Appearing with me today is Mr. Tom Price, our Vice President and General Counsel.

My testimony is presented on behalf of the American Nuclear Energy Council which represents over 100 organizations having an interest in nucler energy, including investor, public and cooperatively owned utilities, manufacturers, architect-engineers, uranium mining companies, both domestic and international, and various other firms engaged in the nuclear fuel cycle.

The uranium producers, who are members of the American Nuclear Energy Council, have concerns in the area of uranium viability, as well as mill tailings cleanup, and have been separately requested to present testimony before this committee today.

Nuclear utilities, who are members of the American Nuclear Energy Council, have an obligation to serve their customers to provide an adequate, reliable supply of electricity at a reasonable price. To do so, nuclear power generation costs, including both capital and fuel costs, should be minimized as much as practicable. Additionally, for nuclear fuel, including natural uranium as well as enrichment costs, diversity and reliability of supply are two other important factors to be considered in utility decisions in order to provide electricity at reasonable cost.

So, Mr. Chairman, I am appearing before you today, sort of straddling the fence between my constituencies.

Senator Ford. You know what Confucius say.

Mr. Davis. I am for my friends, and I have them on both sides.

Mr. Chairman Ford, Members of the committee, Chairman Johnston, Senator Domenici, you are to be commended for your continued concern and interest in development and utilization of this Nation's energy resources.

From its inception, and under the leadership of its first Chairman, the late Senator Scoop Jackson and his successors, Senators James McClure and now Senator Bennett Johnston, the committee has always shown leadership and strategic vision in addressing America's energy needs.

The hearings today on domestic uranium mining and later this week on uranium enrichment serve to focus attention on a very important U.S. energy resource. Today, nuclear energy provides approximately 15 percent of the Nation's electricity and in a few years will provide over 20 percent by 1990.

In the future, the Nation will need to continue to develop and utilize both coal and uranium, if it is to remain energy independent and energy secure.

Recently, Interior Secretary Hodel has publicly stated his concern over the Nation's increasing dependency on imported oil and the fact that the Nation is now more dependent on foreign oil than it was at the time of the first oil embargo in 1973.

Our Nation and its leaders, as well as the public, should be concerned about this growing energy dependency, lest we find ourselves once again in dire straits similar to the circumstances of the 1970s, when the Nation experienced shortfalls in oil and gasoline lines were prevalent.

In addition to the concern about the adequacy of future oil supplies, there is another area that will merit serious attention, and that is adequate future electricity supply.

Last year, the committee held a set of hearings on the adequacy of future electricity supplies. Testimonies from a variety of witnesses were virtually unanimous, even amongst the economists, I might add, which is a rarity these days, that both new coal and nuclear power plants would have to be ordered and built in order to insure adequate electricity supplies for the 1990s.

Therefore, it is important to insure that nuclear energy remains a viable option for the future.

In order for nuclear energy to remain a viable option for producing electricity, it must be economically competitive. To satisfy this requirement, nuclear power generation costs, including both capital as well as nuclear fuel costs, must be minimized.

Since capital costs are strongly influenced by carrying costs, i.e., the cost of money during construction as well as licensing, which includes both interest and escalation, it is important that the leadtimes during both licensing and construction be reduced from the present range of anywhere from 10 to 14 years. The use of preapproved standardized designs, as well as combined construction permit and operating licenses, would serve greatly to reduce leadtimes and, hence, capital costs.

Both the Department of Energy and the Nuclear Regulatory Commission proposed legislation in the last Congress to provide pre-approved standardized designs, as well as combined construction permits and operating licenses.

Hearings were held before this committee as well as other Senate and House authorizing committees, in which the legislation received strong support. Action should be taken to approve such legislation in this coming Congress.

Nuclear fuel costs should also be minimized consistent with reliability and diversity of fuel supply. The committee's hearings on uranium mining and enrichment are very timely and should be very helpful in resolving many of the difficulties currently being experienced in these areas.

Today, I am here to present just a brief statement to the committee and to touch upon some of the concerns in the uranium mining area.

Later this week, Mr. William S. Lee, Chairman and CEO of Duke Power Company and an ANEC Board Member, will testify on behalf of ANEC and EEI on uranium enrichment and will present a comprehensive statement on both of these issues at that time.

Continued economic supplies of electricity and attendant fuels are required to promote the Nation's economic growth and competitiveness in an expanding global economy. Legislative proposals concerning trade restrictions or fuel resources must therefore balance the need for economic supplies at competitive prices with the continued need for diversified and reliable sources of supply.

Domestic uranium production capability is a hedge against foreign uranium cartels and possible future embargoes.

If Congress chooses to impose import restrictions, the significant hardship upon utilities that hold existing contracts for foreign uranium, both from domestic as well as foreign suppliers, should be considered. To mitigate any price increases, any import restrictions should be gradually phased in with appropriate considerations for grandfathering of existing contracts.

Moreover, any such mandated restrictions should have a definite sunset provision.

In the area of mill tailings, legislative proposals have been made that would require utilities to contribute to the stabilization of uranium mill tailings at active milling sites. Among other things, this proposal is based in part on the premise that prices charged to the utilities, as well as government purchasers, in the past for the uranium generated at these sites were established before the current stringent EPA and NRC regulations for tailings stabilizations were promulgated; and, thus, do not include adequate compensation to the mining companies for mill tailing stabilization.

If Congress determines that a stabilization fund is required as part of a national stabilization and reclamation program, great care should be exercised in determining the establishment of such a fund and the appropriate cost-sharing arrangements.

In summary, electricity needs in the U.S. will continue to grow, and all estimates indicate that the increase in demand will remain for the foreseeable future.

Nuclear energy is expected to provide an even larger portion of that future need, along with coal generated electricity.

The uranium fuel supply is a critical component to the economic operation of nuclear power plants; and the issues involving uranium mining and uranium enrichment are interrelated and, therefore, should be dealt with in a comprehensive fashion.

Moreover, any legislative proposal addressing such issues should equitably balance the various interests of the nuclear energy industry, as well as the interest of electric consumers.

Mr. Chairman, this completes and concludes my statement. I would be happy to answer any questions that the committee might have.

[The prepared statement of Mr. Davis follows:]

STATEMENT OF

EDWARD M. DAVIS, PRESIDENT

AMERICAN NUCLEAR ENERGY COUNCIL

ON BEHALF OF

AMERICAN NUCLEAR ENERGY COUNCIL

ON

URANIUM MINING VIABILITY

BEFORE

SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT

ENERGY AND NATURAL RESOURCES COMMITTEE

UNITED STATES SENATE

MARCH 9, 1987

Mr. Chairman and members of the Subcommittee: I am pleased to appear before you today to testify on domestic uranium mining. My name is Edward M. Davis and I am President of the American Nuclear Energy Council.

My testimony is presented on behalf of the American Nuclear Energy Council (ANEC) which represents over 100 organizations having an interest in nuclear energy, including investor, public and cooperatively-owned utilities, manufacturers, architect-engineers, uranium mining companies (both domestic and international) and various other firms engaged in the nuclear fuel cycle.

The uranium producers, who are members of the American Nuclear Energy Council, have concerns in the area of uranium viability, as well as mill tailings cleanup, and have been separately requested to present testimony today before this Subcommittee.

Nuclear utilities, who are members of ANEC, have an obligation to their customers to provide an adequate, reliable supply of electricity at a reasonable price. To do so, nuclear power generation costs, including both capital and fuel costs, should be minimized. Additionally, for nuclear fuel, including natural uranium as well as enrichment costs, diversity and reliability of supply are two other important factors to be considered in utility decisions in order to provide electricity at a reasonable cost to its customers.

Chairman Ford, you and the members of the Senate Energy and Natural Resources Committee are to be commended for your continued concern and interest in the development and utilization of this Nation's energy resources.

From its inception, and under the leadership of its first Chairman, the late Senator Scoop Jackson and his successors, Senators James McClure and J. Bennett Johnston, the Committee has always shown leadership and vision in addressing America's energy needs.

The hearings today on domestic uranium mining and later this week on uranium enrichment serve to focus attention on a very important U.S. energy resource. Today, nuclear energy provides approximately 15 percent of the Nation's electricity and will provide over 20 percent by the end of the decade.

In the future, the Nation will need to continue to develop and utilize both coal and uranium, if it is to remain energy independent and energy secure.

Recently, Interior Secretary Hodel has publicly stated his concern over the Nation's increasing dependency on imported oil and the fact that the Nation is now more dependent upon foreign oil than it was at the time of the first oil embargo in 1973.

Our Nation and its leaders should be concerned about this growing energy dependency, lest we find ourselves once again in dire straits similar to the circumstances of the 1970's, when the Nation experienced shortfalls in oil, and gasoline lines were prevalent. In addition to the concern about the adequacy of future oil supplies, there is another area that will merit serious attention--adequate future electricity supply.

Last year, the Committee held a set of hearings on the adequacy of future electricity supplies. Testimony from a variety of witnesses was virtually unanimous, even amongst the economists that appeared before the Committee, that new coal and nuclear power plants would have to be ordered and built in order to ensure adequate electricity supplies through the 1990's. Therefore, it is important to ensure that nuclear energy is a viable option for the future.

In order for nuclear energy to remain a viable energy option for producing electricity, it must be economically competitive. To satisfy this requirement, nuclear power generation costs, including both capital as well as nuclear fuel costs, must be minimized.

Since capital costs are strongly influenced by carrying costs, i.e., the cost of money including both interest and esculation, it is important that leadtimes during both licensing and construction be reduced from their present range of anywhere from 10-14 years. The use of pre-approved standardized designs and combined construction permit and operating licenses would serve greatly to reduce leadtimes, and hence, capital costs. Both the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) proposal legislation in the last Congress to provide for pre-approved standardized designs and combined construction permits and operating licenses. Hearings were held before this Committee, as well as other Senate and House authorizing committees, in which the legislation received strong support. Action should be taken to approve such legislation in this Congress.

Nuclear fuel costs should also minimized consistent with reliability and diversity of fuel supply. The Committee's hearings on uranium mining and uranium enrichment are very timely and should be helpful in resolving many of the difficulties currently being experienced in these areas.

Today, I'm here to present just a brief statement and to touch upon some of the concerns in the uranium mining area. Later this week, Mr. William S. Lee, Chairman and CEO of Duke

Power Company, and an ANEC Board member, will testify on behalf of ANEC and EEI on uranium enrichment and will present a comprehensive statement at that time to the Committee.

TRADE RESTRICTIONS ON URANIUM

Continued economic supplies of electricity, and attendant fuels, are required to promote the Nation's economic growth and competitiveness in an expanding global economy. Legislative proposals concerning trade restrictions or fuel resources must therefore balance the need for economic supplies at competitive prices with the continued need for diversified and reliable sources of supply.

Electric utilities support the principle of free and fair international trade for all commodities, including fuels. Trade restrictions and import fees or taxes on equipment and energy fuels, including petroleum, gas, coal and uranium, would result in higher cost to electricity customers.

As with all energy fuels, electric utilities would like to purchase domestic uranium as long as it is priced competitively. Utility management believes that the maintenance of a domestic uranium production capability is desired in the long run in order to protect consumers and ratepayers against potential unfair and unethical foreign trade practices. Domestic uranium production capability is a hedge against foreign uranium cartels and possible embargos.

If Congress chooses to impose import restrictions, the significant hardship upon utilities that hold existing contracts for foreign uranium from domestic, as well as foreign suppliers, should be considered. To mitigate price increases, any import restriction should be gradually phased-in with appropriate grandfathering of existing contracts. Moreover, any such mandated restrictions should have a definite sunset provision.

MILL TAILINGS STABILIZATION

Legislative proposals have been made that would require utilities to contribute to the stabilization of uranium mill tailings at active milling sites. Among other things, this proposal is based in part on the premise that prices charged to the utilities in the past for the uranium generated at these sites were established before the current stringent EPA and NRC regulations for tailings stabilization were promulgated; and thus, did not include adequate compensation to the mining companies for mill tailing stabilization.

Estimated costs of mill tailings reclamation and stabilization have increased as a result of the imposition of new regulatory requirements. Claims that electric utilities and their customers have some further obligation beyond that stated in the original purchase contracts, are challengeable. However, if Congress determines that a stabilization fund is required, as part of a national stabilization reclamation program, great care should be exercised in determining the establishment of such a fund and the appropriate cost sharing arrangements.

SUMMARY

In the aggregate, electricity needs in the U.S. have continued to grow over the past decade, and all estimates indicate that an increase in demand will remain for the foreseeable future. Nuclear energy is expected to provide an even larger portion of that future need.

The uranium fuel supply is a crucial component to the economic operation of nuclear power plants; and the issues involving uranium mining and uranium enrichment are interrelated and therefore, should be dealt with in a comprehensive fashion. Moreover, any legislative proposal addressing such issues should equitably balance the various interests within the nuclear energy industry, as well as the interest of electric consumers.

Senator **Ford**. Thank you.

Mr. Kuhn, if you would proceed, we will tickle both of you with some questions later.

STATEMENT OF THOMAS R. KUHN, EXECUTIVE VICE PRESIDENT, EDISON ELECTRIC INSTITUTE, ACCOMPANIED BY LORING E. MILLS, VICE PRESIDENT, NUCLEAR ACTIVITIES

Mr. **Kuhn**. Mr. Chairman, Members of the committee, I am awful glad Mr. Davis mentioned coal in there because the last time I testified before you was on the clean coal technology program, which I am delighted, with your leadership, we got going.

Senator **Ford**. Well, I thought maybe he was trying to get next to me on that.

Mr. **Kuhn**. Indeed I was, sir. [General laughter.]

Senator **Ford**. Well, keep it up. It sounds all right. [General laughter.]

Mr. **Kuhn**. I do welcome the opportunity to be with you this afternoon to testify on the important issues of uranium supply and mill tailing stabilization.

I am Tom Kuhn, Executive Vice President of the Edison Electric Institute. With me is Loring Mills, our Vice President of Nuclear Activities, to assist in answering your questions.

Comprehensive comments on behalf of electric utilities that address uranium supply and enrichment will be presented by William Lee, Chairman of Duke Power Comany, during the hearing scheduled on March 13.

The segment of comments offered today, on behalf of electric utilities, covers only a portion of the complex issues encountered for the supply of fuel to the Nation's nuclear energy plants.

The Edison Electric Institute is a national association of investor-owned electric companies. Our members serve approximately 73 percent of all ultimate electricity customers in the Nation. They operate 95 nuclear power plants and currently have nine additional units under construction.

These nuclear utilities are the primary domestic commercial users of uranium.

Electric utilities have an obligation to their customers to provide an adequate, reliable supply of electricity at a reasonable price. To do so, they must carefully control all expenses, of which nuclear fuel costs represent a significant portion, and continue efforts to minimize these expenses, which ultimately are paid by their customers through electricity rates.

At present, electric utilities have unrestricted access to the world markets for obtaining uranium and nuclear fuel cycle services on a competigive basis. Any loss of this access could result in higher fuel cycle charges and higher electricity costs.

Similarly, other actions which could result in unnecessary costs, such as proposals that utilities be required, after the fact, to contribute to the stabilization of existing uranium mill tailings, are, by themselves, not in the best interest of the electricity rate payers.

Taken alone, uranium supply and mill tailing stabilization must be viewed as items that have been and should continue to be addressed on a commercial basis between competitive suppliers and customers worldwide.

On the issue of uranium supply, electric utilities support the principle of free and fair international trade for all commodities, including fuels. Trade restrictions and import fees or taxes on equipment and energy forms, including petroleum, gas, coal, and uranium, are inappropriate because they would result in higher cost to electricity customers.

Utilities would like to purchase domestic uranium as long as it is priced competitively. Our estimate is that domestic uranium reserves probably can be mined on a competitive basis to provide an average of over 10 million pounds of U308 each year in the near-term, and approximately 16 million pounds of U308 each year, beginning in the mid 1990s.

This is approximately 30 percent of the requirement for civilian nuclear plants in the U.S.

Thus, a significant portion of the domestic uranium requirements is expected to be filled by domestic suppliers in an unconstrained marketplace.

In fact, domestic suppliers have made sales recently to foreign customers on a truly competitive basis.

Artificial trade barriers that ignore the marketplace and force the development of premium priced reserves should be avoided.

Utilities recognize that it is advantageous to have a competitive domestic uranium supply industry. Even though the principal foreign supplies of uranium are of Canadian and Australian origin—friendly nations—some portion of domestic supply is desirable to achieve maximum dependability and assuring a reliable supply of uranium. Such domestic supply could minimize the potential for international disruptions and foreign control of future prices for uranium.

One complicating aspect of the domestic supply picture is that some domestic suppliers have turned to procuring foreign uranium to satisfy their supply contracts for the delivery of uranium to domestic utilities. In fact, during the past two years, domestic uranium suppliers have imported nearly as much foreign uranium, to fill their existing domestic utility contracts, as has been imported by utilities.

With respect to mill tailing stabilization, the domestic uranium mining industry has proposed that nuclear utilities be required to contribute to the stabilization of existing uranium mill tailings resulting from prior production at active milling sites. This proposal is based on the premise that prices charged to the utilities in the past for the uranium generated at these sites were established before the current stringent EPA and NRC regulations for tailings stabilization were promulgated, and were not sufficient to compensate the mining companies for mill tailing stabilization.

Claims that electric utilities and their customers have some further obligation beyond that stated in the original purchase contracts we feel are inappropriate.

Recent official licensing filings made by some mining concerns with the Nuclear Regulatory Commission for defining values for surety bonds to provide stabilization, indicate that some portion of the tailings can be stabilized to meet existing regulations for less than one dollar per ton.

If Congress determines that a Mill Tailings Stabilization Fund is required, considerable care must be applied to determine the amount of the fund, the appropriate basis for an equitable cost sharing arrangement and the timing of payments into the fund.

Also, if Congress establishes that utilities should contribute to this fund, the amount assigned to utilities should be fixed and defined in such a way so that payments qualify as current deductions for Federal income tax purposes.

In summary, electric utilities support the principle of unrestricted access to competitive sources for all elements of nuclear fuel supply.

Any Congressional actions that restrict competition or free and fair trade, or require electric utilities to contribute moneys to a Mill Tailings Stabilization fund would result in higher costs to utility customers in the form of higher rates for electricity.

Such action should be considered by Congress only in the context of a comprehensive package that addresses all elements of nuclear fuel supply, including uranium enrichment and the responsible organization structure to permit effective participation in a competitive enrichment market.

A fundamental consideration should be to proceed in a way that will achieve reasonable cost electricity to the Nation's consumers and to all domestic industries as one element to permit them to achieve international competitiveness.

Mr. Chairman, that is the prepared statement. I will be glad to address any questions that you or the committee members might have.

[The prepared statement of Mr. Kuhn follows:]

Statement of
Thomas R. Kuhn
Executive Vice President
Edison Electric Institute
to the
Subcommittee on Energy Research & Development
Energy and Natural Resources Committee
U.S. Senate
on
Uranium Supply and Mill Tailings Stabilization
March 9, 1987

I am Thomas R. Kuhn, Executive Vice President of the Edison Electric Institute, and with me is Loring E. Mills, Vice President of Nuclear Activities, to assist in answering your questions. Comprehensive comments on behalf of electric utilities that address uranium supply and enrichment will be presented by William S. Lee, Chairman of Duke Power Company, during the hearing scheduled on March 13. The segment of comments offered today, on behalf of electric utilities, covers only a portion of the complex issues encountered for the supply of fuel to the nation's nuclear energy plants.

The Edison Electric Institute (EEI) is the national association of investor owned electric companies. Its members serve approximately 73 percent of all ultimate electricity customers in the nation. They operate 95 nuclear plants and currently have 9 additional units under construction. These nuclear utilities are the primary domestic commercial users of uranium.

Electric utilities have an obligation to their customers to provide an adequate, reliable supply of electricity at a reasonable price. To do so, they must carefully control all expenses, of which nuclear fuel costs represent a significant portion, and continue efforts to minimize these expenses, which ultimately are paid by their customers through electricity rates. At present, electric utilities have unrestricted access to the world markets for obtaining uranium and nuclear fuel cycle services on a competitive basis. Any loss of this access could result in higher fuel cycle charges and higher electricity costs. Similarly, other actions which could result in unnecessary costs, such as proposals that utilities be required, after the fact, to contribute to the stabilization of existing uranium mill tailings, are by themselves not in the best interests of the electricity ratepayers.

Taken alone, uranium supply and mill tailing stabilization must be viewed as items that have been and should continue to be addressed on a commercial basis between competitive suppliers and customers world-wide.

Uranium Supply

Electric utilities support the principle of free and fair international trade for all commodities, including fuels. Trade restrictions and import fees or taxes on equipment and energy forms, including petroleum, gas, coal, and uranium, are inappropriate because they would result in higher cost to electricity customers.

Utilities would like to purchase domestic uranium as long as it is priced competitively. Our estimate is that domestic uranium reserves probably can be mined on a competitive basis to provide an average of over 10 million pounds of U_3O_8 each year in the near term and approximately 16 million pounds of U_3O_8 each year beginning in the mid 1990s. This is approximately 30 percent of the requirement for civilian nuclear plants in the U.S. Thus, a significant portion of the domestic uranium requirements is expected to be filled by domestic suppliers in an unconstrained market place. In fact, domestic suppliers have made sales recently to foreign customers on a truly competitive basis. Artificial trade barriers that ignore the market place and force the development of premium priced reserves should be avoided.

Utilities recognize that it is advantageous to have a competitive domestic uranium supply industry. Even though the principal foreign supplies of uranium are of Canadian and Australian origin -- friendly nations -- some portion of domestic supply is desirable to achieve maximum dependability in assuring a reliable supply of uranium. Such domestic supply could minimize the potential of international disruptions and foreign control of future prices for uranium.

One complicating aspect of the domestic supply picture is that some domestic suppliers have turned to procuring foreign uranium to satisfy their supply contracts for the delivery of uranium to domestic utilities. In fact, during the past two years, domestic uranium suppliers have imported nearly as much foreign uranium, to fill their existing domestic utility contracts, as has been imported by utilities.

Mill Tailings Stabilization

The domestic uranium mining industry has proposed that nuclear utilities be required to contribute to the stabilization of existing uranium mill tailings resulting from prior production at active milling sites. This proposal is based on the premise that prices charged to the utilities in the past for the uranium generated at these sites were established before the current stringent EPA and NRC regulations for tailings stabilization were promulgated, and were not sufficient to compensate the mining companies for mill tailing stabilization. Claims that electric utilities and their customers have some further obligation beyond that stated in the original purchase contracts are inappropriate.

Recent official licensing filings made by some mining concerns with the Nuclear Regulatory Commission, for defining values for surety bonds to provide stabilization, indicate that some portion of the tailings can be stabilized to meet existing regulations for less than one dollar per ton. If Congress determines that a Mill Tailings Stabilization Fund is required, considerable care must be applied to determine the amount of the Fund, the appropriate basis for an equitable cost sharing arrangement, and the timing of payments into the Fund. Also, if Congress establishes that utilities should contribute to this fund, the amount assigned to utilities should be fixed and defined in such a way so that payments qualify as current deductions for Federal income for tax purposes.

Summary

Electric utilities support the principle of unrestricted access to competitive sources for all elements of nuclear fuel supply. Any Congressional actions that restrict competition, or free and fair trade, or require electric utilities to contribute monies to a Mill Tailings Stabilization Fund, would result in higher costs to utility customers in the form of higher rates for electricity. Such action should be considered by Congress only in the context of a comprehensive package that addresses all elements of nuclear fuel supply, including uranium enrichment and the responsible organization structure to permit effective participation in a competitive enrichment market. A fundamental consideration should be to proceed in a way that will achieve reasonable cost electricity to the nation's consumers, and to all domestic industries as one element to permit them to achieve international competitiveness.

Senator **Ford**. Thank you very much, Mr. Kuhn.

Let me get right to something here that you gentlemen do not quite agree on.

I believe Mr. Davis said in his statement, if I have it right, that we needed a domestic uranium industry for a hedge. I think you used the word "hedge.'

Mr. Kuhn thinks we ought to have a free and open market to keep rates down.

How much would it cost the rate payer? Do you have some kind of figure? Maybe Mr. Davis or Mr. Kuhn can allude to it—both of you. How much would it cost to keep a viable industry? Do you have any idea what it would cost the rate payer?

Mr. **Kuhn**. Mr. Chairman, we do not have those exact figures. As we know, the lowest cost uranium resources are in Canada and Australia, and if utilities are denied free access to those low cost resources, they would have to use higher cost resources as a result.

Senator **Ford**. But in Canada, I think we have, without a doubt, established, and we also know that uranium is sold here cheaper than it is sold in Canada. It is being subsidized by the Canadian Government.

What is it worth to us to have a viable industry so that we will not get into the problems we faced in oil, so that we will not get into the five or six years as was testified here earlier needed to gear up the market?

There is something to security, something to the future in this country, rather than just saying a free and open market, and then they will shut the door on us and where are we?

Mr. **Kuhn**. Mr. Chairman, my testimony does not necessarily disagree with Mr. Davis'. The utilities do desire to have some level of domestic uranium production to assure that overall reliability and national security that Mr. Davis referred to.

Senator **Ford**. But no one really wants to pay for it, and, somehow, it has to be paid for.

I just wondered what it would cost, what would be the additional cost to the many rate payers if we worked out some formula and made it stable, like the fuel adjustment clause. We talked about coal, where the cost of coal is going down now, so you get a credit in your rate. Maybe the cost will go up a little bit and it will be factored in in some way.

I am trying to find a way, an answer, and you two gentlemen probably have it. I want to try to pull it out of you, if I can.

Mr. **Kuhn**. Loring, did you have anything you wanted to add to that?

Senator **Ford**. I just want to know what kind of costs we are talking about, a ballpark figure, for keeping a viable industry.

Mr. **Mills**. Mr. Chairman, my name is Loring Mills. It is very difficult to predict what the price of uranium would be under various circumstances. We are sure that if you establish some restriction on the ability to have access to the offshore uranium, the price will increase.

We have tried to assign values to that increase in cost at different levels of import, and it is very difficult to do that.

The **Chairman**. Mr. Chairman, would you yield?

Senator **Ford**. Sure. I would be glad to.

The CHAIRMAN. Mr. Kuhn says that nuclear fuel costs represent a signficant portion of electric costs.

Do you know what portion, and particularly what portion U308 represents?

Mr. MILLS. If I might, I just happen to have the numbers here for the breakdown of the costs of nuclear energy. As we showed, the cost of nuclear energy, the fuel itself is about 10 percent of the cost of the nuclear energy. Recognize that fuel costs are the only real advantage that is available for nuclear energy.

The CHAIRMAN. What is it if you use U308?

Mr. MILLS. The U308 costs, that of the uranium cost is approximately one-third, a little bit more than one-third of the fuel cost. So, if you take that, it is somewhere around 3 percent of the overall cost of electricity from nuclear energy plants.

The CHAIRMAN. So, if you went from $20 to $30, you would go up about a percent and a half, is that about right, for the cost of electricity?

Mr. MILLS. That is correct.

The CHAIRMAN. Is that the order of magnitude?

Mr. MILLS. That is correct.

Senator FORD. If the price of uranium would go from $20 to $30 a pound, and the increase in the cost would be—to the rate payer now, am I right on that—it would be 1 to 1.5 percent?

Mr. MILLS. Perhaps of the cost of nuclear energy production—that is correct.

Senator FORD. What would be the ultimate cost to me, then, as an energy purchaser?

Mr. MILLS. This is at total nuclear energy costs of in the range of five cents per kilowatt hour, so if you are talking about five cents per kilowatt hour as the cost of electricity from nuclear energy, this would increase it a small amount.

We estimate the total amount of an increase from $20 to $30 over the time period in which we will require a very large number of tons of material, you are talking about more than $1 billion in total added energy costs before the end of the century.

Senator FORD. Before the end of the century. So, we are talking about $1 billion in the next 13 years?

Mr. KUHN. Over that period of time.

Mr. MILLS. It is more than that. I do not have the precise number at this point.

Senator FORD. More years or more dollars?

Mr. MILLS. More dollars.

Senator DOMENICI. And, Mr. Chairman, you are talking about the whole thing going from $20 to $30, when no proposal around us has that. The old stuff stays, you phase it in—is that not right?

Your numbers are given if you went from $20 to $30——

Senator FORD. Today.

Senator DOMENICI [continuing]. As in here is a user and you went from $20 to $30.

The Domenici proposal of 50 percent had all the old contracts staying in and all the other things. So this would be much different than that.

Mr. MILLS. We are moving around some numbers without having all of the facts right at our hands. But using the proposal of last year, Senator, we believe that there are several billion added costs for uranium under that proposal, between now and the year 2000.

The CHAIRMAN. Mr. Chairman, would you further yield?

Senator FORD. Sure. I am very interested in this.

The CHAIRMAN. Staff is also saying that what you are talking about is busbar costs, which are, in turn, what percentage of the total costs to the user?

Mr. MILLS. Excuse me, I was trying to provide the number actually close to the user.

The CHAIRMAN. I understand that. But a moment ago we established maybe a percent or a percent and a half——

Mr. MILLS. It's at least half, sir.

The CHAIRMAN [continuing]. In increased cost of nuclear electricity. But that is at the plant rather than at the plug.

What percentage of the cost is the electricity as it comes from the plant?

Mr. MILLS. Excuse me, but I was trying to provide, Senator, the fuel cost as a percentage of the delivered cost. The fuel, nuclear fuel cost, is about 10 percent of the delivered electricity to the customer.

The CHAIRMAN. The delivered electricity. Okay. So the percent or the percent and a half is a correct estimate, for the user.

Mr. MILLS. Yes.

Senator FORD. So, if it is five cents per kilowatt, it would be a fraction more?

Mr. MILLS. Yes.

Senator FORD. It would be 1 percent to 1.5 percent?

Mr. DAVIS. One cent to one and a half cents.

Senator FORD. No—percent is what he said. Percent. One and a half percent. And so, you would take 1.5 percent of five cents, and that would be half a mill. Yes, half a mill.

Now we are getting down to where I can understand this, to the lower level. What do they say, put the jam on the lower shelf so the little man can reach it. [General laughter.]

Mr. MILLS. Senator, it is approximately $150 million a year. Half a mill is approximately $150 million to $200 million a year.

Senator FORD. That is for all of the rate payers? That would be the pass-through costs to all of the rate payers receiving energy generated by nuclear?

Mr. MILLS. That's correct.

Senator FORD. That would be $30 a ton.

Senator DOMENICI. It was under that hypothetical.

Senator FORD. Yes, and much less under phase-in and other things.

We are beginning to get down to where we can buy it, I guess.

Let's talk about clean-up a little bit, if we may.

What should be done about clean-up of the active sites covered by Senate bill 1004 last year?

Do either one of you want to tackle that first?

Mr. Davis, I will let you go first.

Mr. DAVIS. I will take part of it.

I think the uranium purchased under government contracts, which I understand is 30 percent of the tailings that is residing in active sites, I think there is an obligation on the part of the Federal Government to share in the clean-up of those mill tailings.

Senator FORD. Then who else should pay for the rest of it? Are you willing to let the operator pay for the rest of it?

Mr. DAVIS. Well, I would defer to Mr. Kuhn on my right, here, to speak to the utility portion, or their willingness to clean up the costs of these sites.

But I think there is certainly an obligation on the part of the Federal Government to participate in a cost-sharing arrangement for the clean-up of comingled mill tailings.

Senator FORD. I think the only thing we got from the last witness was that mathematically we were right. Beyond that, I don't think we were able to get very much further.

Mr. Kuhn, did you have some comment you wanted to make as to that?

Mr. KUHN. Well, Senator, as I said in my testimony, I believe that utilities operated under the contracts where they paid for the uranium under specific contracts that did not call for future added payments for such work, and, therefore, we do not believe that we have a specific financial responsibility to pay any additional amounts for mill tailing stabilization.

On that question, I really believe that both the mining companies and the utilities agree that the EPA and NRC requirements are overly stringent in this regard. But there has been a difference, as I indicated in my testimony, as to how much money it might take to clean up the mill tailing stabilization.

As I indicated in my testimony, if Congress believes that the utilities are required to pay for some of that amount, we think that the specific things that I mentioned in my testimony should need to be followed.

Senator FORD. I guess both of you are familiar with the National Academy of Sciences study on uranium mill tailings. Does this justify a new look at EPA regulations in your opinion?

Mr. KUHN. I would like to ask Loring to answer that question.

Senator FORD. Mr. Mills.

Mr. MILLS. We have not had an oportunity to study that or to be able to pass judgment on that particular study. We will look at it to determine it.

We do believe, though, that the rules, as established, were very stringent rules. They may have been in excess of what is needed to properly protect the health and safety of the public.

Senator FORD. Well, if you believe that the changes are justifiable, could it reduce the cost of clean-up? If it does, how much would it reduce the cost?

Mr. MILLS. Mr. Chairman, we have not attempted to make our own estimate of what the cost will be for cleaning up mill tailings. We must defer that to others. We just do not have either the experience nor have we made an attempt to establish that cost. So it would be inappropriate for us to assess that there might be a lower cost.

Senator FORD. Mr. Mills, could you look at that and give us some judgment on it in a timely fashion so that we might have your view before we move on with this legislation?

Mr. MILLS. We will look at that study, yes.

Mr. KUHN. Senator, I think it goes without question that we feel it would considerably reduce the cost. We just have not done our own research on that.

Senator FORD. Would you then do your homework on that one for us and let us know what your feelings are, because we were looking at $4 billion, then we looked at $2 billion, and then at $260 million, and we are looking at $800 million. For Senate Bill 1004 we need all of the input of the best minds that we can have on this, Mr. Kuhn.

Mr. KUHN. I appreciate that, Senator. Since it has not been a utility activity, we really have no direct knowledge in that area. But we will look into it and give you our comments.

Senator FORD. I think at some point you could expect to be paid for at least some portion of it, and I am very hopeful that you would want to look at all of the aspects of that. Give us your best judgment so that we will be able to exercise our best judgment.

Mr. KUHN. We will do so, sir.

[The information follows:]

EDISON ELECTRIC INSTITUTE The association of electric companies

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Washington, D.C. 20036-3691
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Insertion for the Record of the Hearing on Uranium Supply and Mill Tailings Stabilization, Before the Subcommittee on Energy Research and Development on March 9, 1987.

Edison Electric Institute (EEI) offers the following comments on uranium mill tailings stabilization -- S. 1004 last year set up a uranium mill tailings stabilization plan based on reclamation costs of $4.50 per ton. Official licensing filings made by some mining concerns with the Nuclear Regulatory Commission, for defining values for surety bonds to cover stabilization costs, indicate that some portion of tailings can be stabilized to meet existing regulations for less than that amount.

While EEI does not have technical expertise in the stabilization of mill tailings, based on our limited review of the National Academy of Sciences study Scientific Basis for Risk Assessment and Management of Uranium Mill Tailings, it would appear that there may be some basis for a new look at the current EPA regulations regarding uranium mill tailings stabilization. Justifiable changes in the regulations, which would not compromise the health and safety of the public, should be implemented as a method for further reducing the costs associated with stabilization.

Senator DOMENICI. Thank you very much, Mr. Chairman.

Mr. Chairman, last year the American Nuclear Energy Council passed a resolution in support of Senate Bill 1004, as amended.

Has anything caused you to change your position since last year?

This is the Domenici bill that had all three parts—the industry, the clean-up, and setting the amounts the utilities actually owed as reimbursement to the Federal Government, which is a very large matter in dispute.

I would ask that their resolution supporting it last year, dated September 9, be made a part of the record.

Senator FORD. Without objection.

[The resolution follows:]

September 9, 1986

RESOLUTION

URANIUM INDUSTRY AND ENRICHMENT PROGRAM VIABILITY

WHEREAS, adequate electricity is an essential ingredient for a modern, growing economy;

WHEREAS, coal and uranium are the only two viable energy sources for additional central-station, electrical generating capacity;

WHEREAS, the national interest requires that the nation not become overly dependent on any foreign source of energy, including uranium;

WHEREAS, the national interest, including national security, is served by maintaining a viable domestic uranium mining industry;

WHEREAS, the Department of Energy, under the requirements of the Atomic Energy Act of 1954, as amended, has determined that the domestic uranium mining industry is not viable;

WHEREAS, the national interest also requires the maintenance of a reliable and economic domestic uranium enrichment capability to ensure that the U.S. remains competitive with foreign sources of supply;

WHEREAS, DOE has submitted to Congress for its approval revised enrichment services criteria which do not have the support of either the uranium mining or the nuclear utility industries;

WHEREAS, DOE's enrichment criteria fail to recognize that nuclear utilities have paid charges for enrichment services that have recovered appropriate government costs, except for $350 million.

WHEREAS, proposed legislation "Uranium Mill Tailings Reclamation Act of 1985" (S. 1004) as amended by Senator Pete Domenici (Amendment No. 1729), has been introduced in the United States Senate with a goal to revitalize the U.S. uranium mining industry and to assure a long-term dependable and competitive U.S. uranium enrichment program;

WHEREAS, S. 1004, as amended by Amendment No. 1729, addresses the essential elements of domestic uranium supply and enrichment capability and strives to equitably balance the various interests within the nuclear energy industry as well as the needs of electric consumers;

THEREFORE, be it resolved by the Board of Directors of the American Nuclear Energy Council that the nuclear energy industry work cooperatively with the Congress in support of S. 1004, as amended by Amendment No. 1729, and with the appropriate and necessary legislative improvements.

Senator DOMENICI. Did anything change your mind?

Mr. DAVIS. No, sir. We support a comprehensive solution to the issues confronting both uranium mining as well as enrichment. If the committee would report out legislation identical or similar to the legislation reported out last year, we would support it.

Senator DOMENICI. I wanted to make one observation, too.

Mr. Kuhn, you said something about how the utilities ought not have to come along after the fact. They had firm contracts, they paid their price.

Let me ask you when the Nuclear Regulatory Commission requires that you backfit some technology, who pays for that?

Mr. KUHN. Well, sir, we try to get that to be put into the cost, the legitimate cost, for building the nuclear power plants or retrofitting the power plants. So it would ultimately be paid by the customers.

Senator DOMENICI. By the rate payer.

Mr. KUHN. Yes, sir.

Senator DOMENICI. Well, you understand that this Senator really wishes that we had the luxury of doing that on the mill tailings, since that has changed dramatically since they piled them up there. We don't have any rate payers; the mining companies do not have any rate payers to go to.

You heard that they lost $350 million, and it looks like it is going to be about the same. That is why we think somebody ought to share the burden.

I think there is a slight similarity, though not necessarily total symmetry.

I just would like to call it to your attention.

Now, I don't believe that we live in a perfect world because, obviously, if we did, I would tend to agree with your testimony that we ought to have a free market policy, and maybe with your testimony which implies that we ought to repeal section 161v. of the Atomic Energy Act, and absolve the utility industry of any obligation on the clean-up.

However, in that perfect world, there are some other things that might be laudable, like do we need a Price-Anderson Act in a perfect world, do we need to maintain a policy of Federal preemption in areas of nuclear safety regulation, and in a perfect world should we trust OMB's accounting system with respect to how much money the utility companies owe for the enrichment process?

I merely indicate those because I know you do not agree with the last half. I do not either.

But, it is not a very perfect world, and so I think we have to look to the next best options. That is what I have been trying to do.

I hope that you, Tom, and the EEI will find a way to support some kind of comprehensive settlement. You need a settlement of the account for enrichment. I mean, talk about rate payers. If you want to have your rate payers pay a bill, just go that one on your own. Without EEI helping the rest of us with our problem, you might be surprised that you all owe what OMB says you owe. My arithmetic says that we could clean up the mill tailings with 20 percent or 30 percent being borne by the utilities, 20 percent or 30 percent by the Feds, 20 percent or 30 percent by the States and set a reasonable rate of return on that debt, and everybody would come out ahead.

So, I do not think we are really talking about these concepts of a perfect world that each of us would like for our respective special kinds of interests which we are bound to try to represent.

Do you have any observations or thoughts about that?

Mr. **Kuhn**. Senator, as you know from my testimony, we do have reservations certainly in the area of import restrictions. We have reservations in the area of mill tailing stabilization.

Nevertheless, we have offered our support for the overall comprehensive approach embodied in S. 1004, with several reservations, and our reservations are particularly that the portion of the bill which relates to the prior unrecovered government cost on the DOE uranium enrichment program and the establishment of future enrichment prices on some reasonable basis, such as recovery of net operating outlays, be maintained, as you had in your legislation, Senator.

But, as I indicated before, we have offered our support for that overall comprehensive approach, and we are still in that position.

Senator **Domenici**. Thank you very much, Tom.

Thank you, Mr. Chairman.

Senator **Ford**. Senator Johnston.

The **Chairman**. Mr. Davis, you say in your statement that utility management believes that the maintenance of a domestic uranium production capability is desired in the long run in order to protect consumers and rate payers against potential unfair and unethical foreign trade practices.

Mr. Kuhn, you say that some portion of domestic supply is desirable to achieve maximum dependability and assuring a reliable supply of uranium.

Are both of you saying the same thing in a little bit different language?

Mr. **Davis**. I think so, sir.

The **Chairman**. I did not expect you to strongly disagree there. [General laughter.]

The **Chairman**. Now, what portion of a domestic industry do we need?

Mr. **Davis**. That is a tough question. Let me try to answer it.

When I was reviewing the report by the Energy Information Agency, the report on the viability of the industry for 1985, it indicated that as of 1985, only three uranium mines were operating in the United States. I am not sure what the current status is today, for 1986. But I think it would be penny wise and pound foolish to loose all on-shore domestic production capability in uranium.

The **Chairman**. Are we not heading in that direction with the present policy and prices?

Mr. **Davis**. I think so, sir.

The **Chairman**. So we need to do something?

Mr. **Davis**. Yes, sir.

The **Chairman**. Isn't an import restriction about the only practical thing we can do?

Mr. **Davis**. There has to be some balance struck between a policy of free and fair trade and a policy of maintaining diverse and reliable supplies of fuel, including domestic production.

The CHAIRMAN. Do you agree with that, Mr. Kuhn?

Mr. KUHN. Senator, we could not support an import restriction without the other elements that are in Senator Domenici's legislation.

We think that the issue of whether or not there should be import restrictions should be addressed in the overall comprehensive way that is embodied in that legislation.

The CHAIRMAN. Mill tailings clean-up, enrichment, and debt.

Mr. KUHN. The issue of prior unrecovered government cost in particular, and the future organizational structure of the enrichment business.

What number would be put on any kind of import restriction really would be up to the Congress.

As I indicated in my testimony, without any restriction at all, we feel that the domestic uranium mining industry would capture 30 percent of the market.

Senator Domenici's bill last year had a number of 50 percent. We certainly think that would be the absolute, uppermost limit that should be imposed.

But, in terms of other specifics, I would let Loring answer that question also.

Mr. MILLS. Senator, we do believe that there will be a domestic uranium industry. The question is what level of industry should we try to retain for national security purposes or for serving the domestic utilities.

The question that was asked of the earlier panel was what got us into the situation today where the uranium mining industry is in as poor shape as it is. We do not like that shape either.

We are sympathetic with the concerns there. But there were three basic underlying factors that caused that.

One was there were several years of overproduction; that is, you produced a lot more than we were consuming. And we ended up with very large inventories. As you heard earlier, there is about five years of inventory in existence today.

Working off those inventories will result in production at a lower rate than consumption for a number of years, and this is going to go on for quite a number of years yet to work them off. If we tried to work them all off quickly, the picture would be much worse than it is today.

So that particular overproduction in earlier years did result in this situation.

The CHAIRMAN. I understand that. The question is how do we preserve what we have, and it seems to me clear that we have to do something with imports and with an eye to enrichment, so that we do not export our enrichment at the same time we try to keep our imports in.

I think that is a solvable thing. The Domenici bill seems to be a good approach to that.

Mr. DAVIS. Senator, again, I would associate our position with Tom Kuhn's earlier remarks, and that is supporting a comprehensive resolution of this.

The CHAIRMAN. I hope that is possible to do this year.

Thank you, Mr. Chairman.

Senator FORD. Thank you.

The fog is beginning to clear just a little bit for me. I am trying to put these pieces together to see how we don't burden Mr. Kuhn's interests too much. We look at your producers and then we begin to look at the ore in stock, which I don't think has been brought out yet. We have talked about enriched stock. We will be down to a 120 day supply by the end of 1988, according to testimony we had earlier.

So we have a lot in this mix that we need to look at very carefully.

I think that your testimony here this afternoon has been very valuable. It has been to this Senator.

I appreciate, Mr. Mills, your giving us these figures. If you will look at some of those questions that I asked you earlier and help us with your expertise to see if we cannot come up with a piece of legislation that looks at the total interests of the United States, our security in the future, and a reasonable price that we can look at, it would be helpful to all of us.

I would be grateful to you.

Mr. MILLS. We certainly will help.

Senator FORD. Fine.

I appreciate that.

Thank you all for coming today. We do appreciate it and we look forward to working with you in the very near future.

Mr. DAVIS. Thank you, Mr. Chairman.

Mr. KUHN. Thank you, sir.

Senator DOMENICI. Mr. Chairman, I thank them also and want to thank them for their past help.

Senator FORD. Yes, they have been very good. We are grateful to them.

Senator DOMENICI. We appreciate it very much.

Senator FORD. The next witnesses will be Nolan Hancock, Director of Citizenship and Legislative Programs, Oil, Chemical and Atomic Workers International Union; and Robert Luke, President of the Uranium Producers of America.

Mr. Hancock is from here in Washington and Mr. Luke is from Oklahoma City.

Mr. Hancock, you will be first. If you want to highlight your statement and submit it for the record, it will be included. Do whatever you want to.

Then we will hear from you, Mr. Luke. And then we will have questions for you both.

STATEMENT OF NOLAN W. HANCOCK, CITIZENSHIP-LEGISLATIVE DIRECTOR, OIL, CHEMICAL AND ATOMIC WORKERS INTERNATIONAL UNION

Mr. HANCOCK. Thank you, Mr. Chairman.

My name is Nolan Hancock, and I am the Citizenship-Legislative Director of the Oil, Chemical and Atomic Workers International Union. I welcome the opportunity to testify on behalf of OCAW concerning the need for a viable domestic uranium industry and tailings reclamation.

Our union represents several thousand workers in the nuclear industry. At one time, we represented 2,000 members that were employed in production and mining of uranium. Now, Mr. Chairman, we have less than 50 that we represent.

Needless to say, the direct effect of the industry's decline has not only impacted severely on the employees and our members and their families, but has also in many instances caused whole communities to be devastated.

The potent combination of high unemployment and community deterioration ultimately, unfortunately, leaves in its path a terrible human toll, visible in increasing rates of alcoholism, suicides, and marital and family problems.

Mr. Chairman, it is ironic that our domestic uranium production is at its lowest point since the 1950s, when the consumption of uranium in this country is at an all-time high. The feed requirements for our enrichment plants are more than four times greater than our domestic production.

The Secretary of Energy, in December, 1986, found the domestic uranium industry to be nonviable. This is the second year in a row that such a finding has been made.

Yet, despite the mandate of section 161(v) of the Atomic Energy Act, that the Secretary shall maintain a viable domestic producing industry, no steps have been taken to offer help to the producers. In fact, the Secretary of Energy recently testified in the House that the Administration will continue to fight a Federal Court ruling that the Department of Energy must restrict enrichment of foreign uranium.

The Secretary of Energy also stated that DOE was going to sell off some of the uranium in the Federal stockpile. These do not appear to be actions designed to revitalize the domestic uranium industry.

If the uranium producing industry remains shut down for a period of years, skilled workers will be forced to leave the mining communities and seek other forms of employment. Further, we stand to lose valuable uranium reserves as more mines are flooded and abandoned.

Nuclear power is crucial to national security and our defense, and our Nation cannot afford to be at the mercy of foreign governments for the production of this key element.

Further dismantling of the domestic industry is not a wise course to follow.

Last year, this subcommittee heard testimony on the Uranium Revitalization and Tailings Reclamation Act of 1986. The OCAW supported this legislation.

This legislation called for restrictions on the import of foreign uranium in order to revitalize the domestic industry. This action recognized existing law in the Atomic Energy Act that the United States must have a viable domestic uranium industry.

Congress placed such language in the Atomic Energy Act in order to insure our country's energy independence and national security.

The condition of the industry is more critical than ever, and we urge the committee and Congress to again provide legislation that will provide some restriction to the imports of foreign uranium or to such an extent as to make the domestic uranium industry viable.

The Department of Energy says trade restrictions would only benefit the industry on the short-term. We beg to differ, recognizing that any increase in demand for domestic uranium would be a welcome change to the drastic slide domestic production has faced over the past several years.

Mr. Chairman, a favorite word in Congress this year is "competitiveness." Because the Department of Energy continues to ignore the mandate of the Atomic Energy Act, enacted by Congress, we must ask your assistance in helping our workers obtain the opportunity to compete on a more equal basis with the importers of foreign uranium.

But they cannot compete against foreign producers that are subsidized by their governments and our own government's policy that pushed them down at every opportunity.

Canadian utilities are required by their government's policies to purchase Canadian produced uranium at prices higher than uranium is sold to U.S. utilities. This does not create a level field of competition.

Our government agencies insist on the highest environmental standards under which our producers must operate. These high standards increase the cost of the product. Yet, the Federal Government is not willing to give any support in assisting the industry in selling its product, and this despite the fact that the Atomic Energy Act requires the DOE to maintain a viable industry.

Finally, the DOE's overly-optimistic estimates of uranium needs encouraged over-production. Now, instead of enhancing the competitive abilities of our members, DOE wants to further flood the marketplace with uranium from the government stockpile.

With regard to reclamation of uranium mill tailings, I would note that it was established last year that the Federal Government had an obligation to contribute to the reclamation of these tailings created under the Atomic Energy Commission contracts. Such assistance would further enhance the viability of the producing companies by removing a potential liability from the cost of operation.

The workers involved in the domestic mining and milling industry are proud to have played a key role in producing fuel for the nuclear industry. I hope that legislation will be produced from this hearing that will assist these workers to revitalize the domestic industry.

That concludes my prepared statement, Mr. Chairman.

[The prepared statement of Mr. Hancock follows:]

TESTIMONY OF
NOLAN W. HANCOCK
ON BEHALF OF THE
OIL, CHEMICAL AND ATOMIC WORKERS INTERNATIONAL UNION
BEFORE THE
SENATE ENERGY AND NATURAL RESOURCES COMMITTEE
CONCERNING
THE VIABILITY OF THE DOMESTIC URANIUM INDUSTRY AND TAILINGS RECLAMATION

MARCH 9, 1987

Mr. Chairman and members of the Committee, my name is Nolan W. Hancock. I am the Citizenship-Legislative Director of the Oil, Chemical and Atomic Workers International Union. I welcome the opportunity to testify on behalf of the OCAW concerning the need for a viable domestic uranium industry and tailings reclamation.

OCAW is the primary representative for workers employed in energy or fuel producing industries, with the exception of coal, with a total membership exceeding 100,000 members.

Our union represents several thousand workers in the nuclear industry. At one time, 2,000 of our members were employed in the production and mining of uranium. We now have less than 50 members involved in the mining and milling of domestic uranium.

Needless to say, the direct effect of the industry's decline has not only impacted severely on the employees and their families, but has in many instances caused whole communities to be devastated.

The potent combination of high unemployment and community deterioration ultimately and unfortunately leaves in its path terrible human toll, visible in increasing rates of alcoholism, suicides, and marital and family problems.

It is ironic that our domestic uranium production is at its lowest point since the 1950's when the consumption of uranium in this country is at an all time high. The feed requirements for our enrichment plants are more than four times greater than our domestic production. The Secretary of Energy in December, 1986 found the domestic uranium industry to be non-viable. This is the second year in a row that such a finding has been made. Yet despite the mandate of Section 161(v) of the Atomic Energy Act that the Secretary shall maintain a viable domestic producing industry, no steps have been taken to offer help to the producers. In fact, the Secretary of Energy recently testified in the House that the Administration will continue to fight a federal court ruling that the Department of Energy must restrict enrichment of foreign uranium. The Secretary of Energy also stated the DOE was going to sell off some of the uranium in the federal government stockpile. These do not appear to be actions designed to revitalize the domestic uranium industry.

If the uranium producing industry remains shut down for a period of years, skilled workers will be forced to leave mining communities to seek other forms of employment. Further we stand to lose valuable uranium reserves as more mines are flooded and abandoned. Nuclear power is crucial to national security and defense. Our nation cannot afford to be at the mercy of foreign governments for the production of this key element. Further dismantling of the domestic industry is not a wise course to follow.

Last year this Subcommittee heard testimony on the Uranium Revitalization and Tailings Reclamation Act of 1986. This bill was introduced by the Senators from New Mexico, Wyoming, and Utah. It was overwhelmingly passed by the Senate Energy and Natural Resources Committee. The OCAW supported this legislation.

The legislation called for restrictions on the import of foreign uranium in order to revitalize the domestic industry. This action recognized existing law in the Atomic Energy Act that the United States must have a viable domestic uranium industry. congress placed such language in the Atomic Energy Act in order to ensure our country's energy independence and national security. The condition of the industry is more critical than ever and we urge the Committee and Congress to again provide legislation that will provide some restriction to the imports of foreign uranium ore to such an extent as to make the domestic uranium industry viable. The Department of Energy says trade restrictions would only benefit the industry on the short-term. We beg to differ, recognizing that any increase in demand for domestic uranium would be a welcome change to the drastic slide domestic production has faced over the past several years.

Mr. Chairman, a favorite word in Congress this year is "competitiveness." Because the Department of Energy continues to ingnore the mandate of the Atomic Energy Act enacted by the Congress, we must ask your assistance in helping our workers obtain the opportunity to compete on a more equal basis with the importers of foreign uranium. Our former workers in the uranium production field were and remain excellent and efficient miners and millers. But they cannot compete against foreign producers that are subsidized by their governments and our own government's policies that push them down at every opportunity.

Canadian utilities are required by their government's policies to purchase Canadian-produced uranium at prices much higher than this uranium is sold to U.S. utilities. This does not create a level field of competition.

Our government agencies insist on the highest environmental standards under which our producers must operate. These high standards increase the cost of the product, yet the federal government is not willing to give any support in assisting the industry in selling its product. This despite the fact that the Atomic Energy Act requires the DOE to maintain a viable industry.

Finally, the DOE's overly-optimistic estimates of uranium needs encouraged over-production. Now instead of enhancing the competitive abilities of our members, DOE wants to further flood the marketplace with uranium from the government stockpile.

With regard to reclamation of uranium mill tailings, I would note that it was established last year that the federal government had an obligation to contribute to the reclamation of those tailings created under Atomic Energy Commission contracts. Such assistance would further enhance the viability of the producing companies by removing a potential liability from the cost of operation.

The workers involved in the domestic mining and milling industry are proud to have played a key role in producing fuel for the nuclear industry. I hope that legislation will be produced from this hearing that will assist these workers to revitalize the domestic industry.

Senator FORD. Thank you very much, Mr. Hancock.
Mr. Luke.

STATEMENT OF ROBERT P. LUKE, PRESIDENT, URANIUM PRODUCERS OF AMERICA

Mr. LUKE. Mr. Chairman, Senator Domenici, with your permission, I would like to submit my formal testimony for the record and make just a few comments.

Senator FORD. Mr. Luke, that would be fine. Your statement will be included in the record.

Mr. LUKE. Thank you.

Mr. Chairman, last year Senator Domenici introduced, with the co-sponsorship of Senators Bingaman, Simpson, and Wallop, S. 1004, which, in our view, was one of the first—in fact, the first—comprehensive approach to uranium legislation since the 1964 private ownership amendment.

The Uranium Producers of America support vigorously this approach and recognize the need for comprehensive legislation that addresses all of the problems in the front end of the uranium fuel cycle.

Mr. Chairman, we are painfully aware of the very serious problems confronting the uranium industry and the U.S. enrichment industry as well.

In New Mexico, for example, employment in the uranium industry has declined from about 10,000 in 1980, to less than 300 today.

For more than three years, we have tried to take our grievances and address our needs to the Department of Energy. We met with Secretary Hodel in 1984. We met again with Secretary Herrington in 1985, and were unable to receive any sort of consideration whatsoever. Consequently, the producers commenced a lawsuit in 1985, which has already been discussed today.

In your opening remarks, you indicated that you preferred we not get into that, and we prefer to let the court take its own action as well.

But you may be interested to know that at the current rate of uranium production in the United States, only about 20 percent of the enrichment plant feed demand is being met from domestic production, and that does not include any supplies for the Department of Defense. In fact, the Federal Government has not purchased uranium from domestic sources or, to our knowledge, from other sources since 1970.

Now, there have been some statistics given this morning on the fact that the U.S. Government supplies for the military program are adequate through the year 2000. I submit to you that I have tried to question the DOE and DOD on this issue, and their answers are just about as fuzzy on the stockpile as they are on the question of viability. They talk in terms of "stripping the tails" during the 1990s to provide for the military requirements, which means that they would take the lower enriched uranium tails materials, as opposed to natural uranium.

I don't know what the economics of that really are, but it could be that they would seriously change the economic vitality of enrichment plants if that were, indeed, the plan.

Mr. Chairman, our investment in U.S. nuclear facilities is absolutely immense. Goodness knows, these nuclear plants have cost more than they ought to have. But we have invested over $200 billion in this country in nuclear power facilities, and more, of course, earlier on in the enrichment facilities.

There is no substitute for a raw material in any of these plants. It is not like oil or gas or coal. You have to have uranium to run a uranium reactor, and you have to have uranium to run an enrichment plant.

Now, the DOE is just dead wrong when they say that the U.S. uranium industry would be a burden to the U.S. enrichment business. It is just exactly the other way around.

Anyone who operates any sort of advanced processing facility in this country recognizes that a secure, domestic raw material supply is certainly to your advantage, and not to your detriment in the long run. We cannot let some very, very short-term objectives get in the way of a long-term program that we are trying to design through the year 2000.

The Department of Energy has also argued that reduced market demand is primarily responsible for the problems in the uranium industry.

I will submit to you, Mr. Chairman, as Mr. Hancock just now referred to, the uranium market is, in fact, growing rather rapidly. It is the fastest growing energy market in the world.

Now, I agree that we foresaw much higher growth than we actually have achieved, and we did over-build in anticipation of that growth. But the biggest single effect on the uranium industry and on the enrichment industry, and the reason we have so many people out of work, not only in the uranium business but also at the enrichment plants, is the new U.S. uranium enrichment contract that was entered into in 1984.

That contract provided for very rapidly reductions in enriched uranium inventories. In our view, this should have been achieved over a longer and more gradual period of time, without necessarily taking all the effect in the raw material side of this industry.

Now, when the DOE tries to adopt policies and does adopt policies that injure the raw materials industry, and says that that is going to affect their ability to market enrichment services abroad, that is a lot like shooting your own decoys.

We, in fact, know that there are fuel packages being marketed by foreign enrichment companies that include uranium and include other fuel cycle services, and the United States has to have an integrated fuel supply industry to be competitive over the long run.

Mr. Chairman, the uranium enrichment and the uranium industries are both in very serious trouble. We think the best solution to these inter-related problems of raw material supply and enrichment is comprehensive legislation similar in approach to that passed by this committee during the Ninety-ninth Congress.

From the standpoint of the uranium industry, we believe this legislation should address the following issues:

Number one, domestic use. The producers support a requirement that uranium loaded into U.S. reactors be mined and milled in the United States. The specific share of this domestic usage requirement should be tailored to existing and future market conditions and must be sufficient to assure and maintain the viability of a domestic uranium mining and milling industry.

Number two, mill tailing reclamation. The uranium producers support a sharing of the costs of tailings reclamation at the active sites, as required by the Uranium Mill Tailings Radiation Control Act and its implementing regulations, on an equitable basis between the mill licensees, the domestic electrical utility industry, and the U.S. Government.

Third, government stockpiles and procurement. The domestic industry supports a requirement that the Department of Energy maintain the existing uranium stockpile, strictly for the Department of Defense use and not dispose of it by sale, over-feeding of the enrichment plants or otherwise, and that future purchases of uranium by the government and by its agencies be made exclusively from domestic sources.

We also believe that the interest charges on the stockpile investment should not be included in the required cost of recovery from the enrichment operations.

Mr. Chairman, in my letter of March 5, accepting your invitation to appear at today's hearings, I made note of several recent and important changes in the uranium market, about which the producers have very little information. We believe that current and detailed information on recent foreign uranium imports and commitments, on current plans for over-feeding the enrichment plants by the Department of Energy, on other Department of Energy stockpile and government procurement plans, and on recent "nationality swaps" or trades of uranium by the utilities and the suppliers are essential to understanding the present uranium market status.

We hope the committee will be able to collect this information. The uranium producers are prepared to assist you and your committee staff wherever possible.

Thank you for the opportunity to appear this afternoon.

[The prepared statement of Mr. Luke follows:]

TESTIMONY OF ROBERT P. LUKE
PRESIDENT, URANIUM PRODUCERS OF AMERICA,
BEFORE THE SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

Mr. Chairman and Members of the Subcommittee. My name is Robert P. Luke. I am a vice-president of Kerr-McGee Corporation and serve as President of the Uranium Producers of America (UPA), a trade association of domestic uranium mining and milling companies. I have been involved with various aspects of Kerr-McGee's uranium business for more than twenty years.

On behalf of UPA, Mr. Chairman, I want to express our appreciation for this opportunity to testify about the current status of the uranium industry and the urgent need for legislation to restore and maintain a viable uranium industry in the United States.

Last year, this Committee approved legislation which, for the first time, addressed uranium issues in a comprehensive way. As reported to the Senate, S. 1004 included domestic uranium usage requirements, a program for financing remedial action at mill sites and provisions establishing new policies for the enrichment program. This legislation laid the foundation for legislative action in 1987. However, we believe that some changes will be required this year to take account of new developments.

In approving S. 1004 last year, the Committee approached the problems affecting the front end of the nuclear fuel cycle on a comprehensive basis. It dealt with the influx of uranium imports and at the same time established clearcut policies with respect to the use of the government's uranium stockpile. It addressed uranium supply questions and also took steps to strengthen the competitive posture of the U.S. enrichment industry.

Clearly, Mr. Chairman, the United States can only serve its vital national security interests and compete in world fuel markets if the entire front end of the nuclear fuel cycle is alive and well.

Almost one-half of the capital base of the U.S. power industry is invested in 120 uranium-fueled nuclear facilities that will supply 20 percent of U.S. electricity requirements by 1989. Even if no new nuclear plants are built -- which is unlikely over the long run -- these reactors alone will burn more than 2 billion pounds of U_3O_8 in their lifetimes. For these plants, there is no fuel-switching capability. A long-term, secure supply of uranium is absolutely essential.

I might also add that the single most important strategic defense system for the free world continues to be the U.S. fleet of 150 uranium-fueled submarines on continuous global patrol. These submarines must have sufficient uranium to assure an uninterrupted fuel supply, and so must the surface fleet. Likewise, other U.S. defense needs must be assured. Although government data on the use, inventory, and future defense needs for uranium are not readily available, the Department of Defense should be concerned about reductions in the government's uranium stockpile and the decline of the domestic uranium industry.

The current depressed state of the domestic uranium industry is a matter of public record. In December 1986, the Secretary of Energy formally found the industry not viable for calendar year 1985. A similar finding was made for calendar year 1984. The Department's viability assessment makes clear that our industry is essentially on stand-by and cannot remain in that status much longer.

These conclusions come as no surprise to those of us in the industry who have seen one mill after another close down and employment drop by 90 percent between 1980 and 1985. Uranium production dropped over the same period from more than 40 million pounds per year to about 11 million pounds, the lowest level since 1956. To cite the case of one company, in 1981 Kerr-McGee had 2100 employees producing five million pounds of uranium. In 1986 we had 60 employees producing 150,000 lbs. of uranium.

Without significant policy changes, the Energy Information Administration reports that imports of both natural and enriched uranium could reach at least 60 percent of utility requirements in the 1990s. Because the U.S. industry is only producing some 20-25 percent of domestic requirements, many of us believe that figure is conservative.

For more than three years, the member companies of UPA have sought to secure administrative action to aid the industry, as required by the Atomic Energy Act. In 1984, we presented our case to then Secretary of Energy Hodel. In 1985, we met with Secretary Herrington to seek help. Later that year, Secretary Herrington officially declared the industry non-viable. Since that time, DOE has done little or nothing to help the industry. In fact, DOE has resumed overfeeding its enrichment plants using the government stockpile and has suggested other policies which would further depress the industry. Furthermore, DOE has persistently refused to restrict enrichment of foreign uranium as required by law.

Mr. Chairman, some have portrayed the debate over uranium import restrictions as just another trade issue. This is not the case. The fact is that under section 161(v) of the Atomic Energy Act, enacted in 1964, DOE is obligated to limit the enrichment of foreign uranium for domestic use in order to "assure the maintenance of a viable domestic uranium industry."

The statutory charge is mandatory. Congress directed DOE to take specific action to assure the viability of the uranium industry. That action is the imposition of restrictions on the enrichment of foreign uranium.

It is significant that no enrichment of foreign uranium was allowed until 1977. In 1973, the Atomic Energy Commission approved a plan allowing the gradual removal of restrictions on the enrichment of foreign uranium starting in 1977. The restrictions were phased out entirely at the end of 1983, with the domestic industry deeply depressed. Only during the past three years have we been without such restrictions.

As the legislative history makes clear, Congress intended that a determination of non-viability would lead to action under section 161(v). DOE concedes that a Secretarial determination of non-viability means that the industry is non-viable under section 161(v). However, DOE has refused to take the action required by section 161(v) to assure a viable domestic industry.

Producers Court Action Against DOE

Several uranium producers have filed suit against DOE to challenge the Department's failure to impose import restrictions and take other measures to maintain the viability of the industry. The UPA is participating in this suit as amicus curiae. Last June, the Federal Court in Colorado found in favor of the uranium companies' position on the requirement for DOE to impose restrictions. On June 20, 1986, the Court issued an order requiring DOE (1) to restrict enrichment of foreign-source uranium to no more than 25 percent of its total enrichment activity for the remainder of 1986; (2) to cease enrichment of foreign-source uranium entirely commencing in 1987 (thus returning to the practice followed from 1966 to 1977); and (3) to commence a rulemaking proceeding to determine to what extent, if any, enrichment of foreign-source uranium may be allowed and still assure the viability of the domestic industry.

DOE petitioned for a stay of the District Court order, which was granted by the 10th Circuit Court of Appeals on July 21, 1986. The appeal was argued to a panel of the Circuit Court in September, 1986, but the Court has not yet ruled.

The basis for DOE's argument on appeal is that, contrary to the legislative history, prior interpretation, and plain meaning, the language of section 161(v) does not in fact require DOE to restrict enrichment of foreign-source uranium to assure the viability of the domestic industry. On the contrary, DOE claims it can decide not to impose such restrictions if it concludes that restrictions will not help the industry.

Comprehensive Legislation Is Needed

The Uranium Revitalization and Tailings Reclamation Act approved by the Energy Committee last year was an omnibus bill dealing with both uranium supply and uranium enrichment problems.

In my testimony today, I would like to discuss what we believe to be the essential ingredients of any omnibus legislation for uranium producers.

First, the legislation should recognize the legitimate U.S. interests in national security and energy independence in the nuclear fuel market by providing for U.S. reliance on domestic resources and facilities to whatever extent is necessary to restore and maintain the viability of the domestic producing industry. This is the standard established by Congress in section 161(v) of the Atomic Energy Act. It should also require that the U.S. rely on domestic resources and facilities for a majority of its UF_6 and enrichment needs. Above these minimum levels of domestic reliance, international trade in uranium and enrichment services should be encouraged as long as fair and responsible trading practices are followed.

Second, the legislation should require that the United States government rely exclusively on existing government inventories, facilities and domestic procurement for all its future defense and other needs for uranium and enrichment services. The government's uranium stockpile should not be used for commercial nuclear purposes.

Third, the legislation should provide that the cost of unforeseen federal decisions or regulations that burden the cost of uranium production or enrichment operations be clearly defined and fairly shared by government and industry. These costs include reclamation and decommissioning of existing mill sites and recovery of prior enrichment expenditures. The full cost of future operations that relate to the commercial program should be borne by the industry.

Mr. Chairman, the imposition of domestic usage requirements would reflect what Congress recognized in the Atomic Energy Act: that the national interest requires a viable domestic uranium industry. The relaxation of import restrictions has proved to be a costly mistake which must now be corrected.

Let me comment briefly on the existence of unfair practices with particular reference to Canada, the source of almost 60 percent of our imports. Canada would be a strong competitor for U.S. producers under ordinary circumstances, but we could compete. The fact is, however, that the flood of Canadian imports reflects heavy government subsidies and supports for the Canadian uranium industry. Major portions of that industry are government-owned. It has been subsidized in amounts totaling more than a billion dollars.

The Canadian government also supports its producers through market allocations and exclusion of U.S. producers. Canadian nuclear utilities must buy 100 percent Canadian uranium. In contrast, there is no requirement by DOE that U.S. utilities must buy any domestic uranium. In addition, Canadian utilities buy at prices far above those offered to U.S. utilities. In other words, export prices for Canadian uranium are well below the prices charged on the Canadian market. U.S. producers cannot be expected to compete against this government subsidized operation.

There can be no doubt that the requirement of reliance on domestic uranium for a majority of U.S. needs would be a major step towards restoring a viable uranium industry.

Last year, the Committee approved a domestic usage requirement through the year 2000. Because of changed circumstances, that would not be an appropriate usage requirement for legislation this year. It appears, for example, that new commitments for foreign uranium have been made in recent months and extensive inventory trading of foreign and domestic uranium may have occurred. Also, it has recently been reported that DOE may be considering direct sales from the government stockpile -- an action which would greatly affect the uranium market.

In addition, the pending decision of the Court of Appeals with respect to restricting enrichment of foreign uranium has a direct bearing on any decision with respect to domestic usage requirements. A decision by the Court, which is expected shortly, will help enable us to make an informed recommendation to the Committee on this issue.

Sharing Reclamation Costs

Finally, Mr. Chairman, let me emphasize the need for legislation which, like Title II of S. 1004 last year, provides for a system of funding the cost of reclamation, decommissioning and other remedial action at active mill sites.

The provisions of S. 1004 created a Uranium Mill Tailings Fund as a source of reimbursement to mill owners or licensees. Contributions to the Fund would be made by the mill owners or licensees, nuclear power reactor licensees, the Federal government and, on an optional basis, by states with active uranium mills. The owner or licensees would be required to pay at least one-third of the cost of reclamation and could not, in any event, be reimbursed for an amount above $4.50 per ton of tailings.

This proposed funding system is designed to allocate the costs of reclamation among those who reaped the benefits from uranium produced at the active sites. The utilities, of course, benefitted from uranium produced for use in nuclear reactors. The Federal Government benefitted from uranium produced for defense programs.

It is important to note that uranium producers did not include major reclamation costs in pricing uranium because no such costs were anticipated when the tailings were generated. In fact, during the period when almost all uranium was being produced, the potential health hazards of tailings were not recognized and extensive reclamation requirements did not exist.

In 1978, Congress established a new regulatory regime for uranium mills and mill tailings with enactment of the Uranium Mill Tailings Radiation Control Act. In 1979, the General

Accounting Office (GAO) recommended that Congress provide assitance to the active site owners for the reclamation of tailings generated under Federal contracts. This recommendation was based on several factors including the Federal role as buyer of the uranium, the fact that possible hazards from tailings were not recognized and the fact that government procurement contracts did not require reclamation of tailings. The GAO concluded that the mill owners had acted in good faith and should not bear the subsequent costs of reclamation by themselves.

In light of this history, the joint funding system approved by the Committee last year is, in the words of the Committee's report, "a fair and equitable approach to the essential task of mill tailings reclamation." It recognizes that new reclamation requirements have been imposed long after the uranium was produced, whether for commercial reactors or defense purposes. In fact more than 90 percent of the tailings were generated prior to the 1978 Act. An even greater percentage was produced before the stringent NRC and EPA regulations were adopted. As a result, uranium producers never had a chance to price their product to include the tremendous reclamation costs now being imposed. Because these costs would have been shared by the Federal government and utilities had they been imposed at the outset, it is entirely appropriate that they join with the producers in paying these costs now.

In connection with the mill tailings issue, I should note that a special study group of the National Research Council has recently published a comprehensive study on the "Scientific Basis for Risk Assessment and Management of Uranium Mill Tailings." Members of UPA are now reviewing this important report and would appreciate the opportunity to submit a written statement commenting on its conclusions for the hearing record.

Mr. Chairman, thank you again for scheduling these hearings and giving the UPA an opportunity to testify. We look forward to working with you and Senator Domenici and your colleagues in developing legislation that will preserve a viable uranium industry and vigorous enrichment enterprise.

Senator **Ford**. Thank you, Mr. Luke.

Mr. Hancock, we have had extended discussions today and projections and estimates kind of all over the ballpark. We have discussed what the cost of cleanup might be and who should pay those costs and how much should be contributed by each of the factors.

Last year, as you have heard today and as you know, we reported out S. 1004, which contained cost-sharing.

Now, 30 percent of the costs would be shared by those who had the license; 37 percent by the utilities and approximately 20 percent by the Federal Government.

Do you think this is an appropriate percentage, or how would you allocate the percentages of clean-up costs?

Mr. **Hancock**. I think that is an appropriate percentage, and we supported that provision in the past.

Senator **Ford**. Mr. Luke, are the producers and miners helped by the restrictions on the importation of foreign uranium, or, as some have contended, and you have heard them here today, I am sure, the import restrictions only cause utilities to seek both natural uranium and enrichment service abroad?

Mr. **Luke**. Well, Senator, in the bill that was proposed last year, the restriction was on uranium as loaded into reactors. So it would affect equally the DOE enrichment plants or foreign enrichment plants. It would not have any anti-competitive effect on DOE whatsoever.

Furthermore, DOE has under contract over 90 percent of the business now, under the new enrichment contract. So, for quite a few years, they are really not in jeopardy at all.

Senator **Ford**. Then, what you are saying to me is the Department of Energy needs some kind of legislation to protect their 90 percent of the business?

Mr. **Luke**. I think it is possible that they may. But, you know, with the dollar changing as rapidly as it has, they are much more competitive today than they were in the past. And they have already contracted most of the U.S. reactor requirements. I believe—I am not an expert on enrichment contracts—but I believe those contracts cannot be terminated for about ten years.

Senator **Ford**. Now, on the enrichment contract, that may be true. But on the raw materials, I do not believe that is quite right. Is it?

Mr. **Luke**. No, sir. It is not.

There is some available market for uranium in the next few years, but it is pretty limited. The largest market for uranium does not really develop that is not contracted until the 1990s.

Senator **Ford**. You stated earlier that the 1984 contract—or was it a treaty that you referred to? Was it a contract?

Mr. **Luke**. Sir, it was a new enrichment contract entered into by DOE, designed to keep their customers. They needed to do something. We recognized that. We just think they did not give any consideration whatsoever to the front side.

Senator **Ford**. You said in that statement, as I recall—and correct me if I am wrong with my memory—that it reduced the enrichment. We heard a statement here today that by the end of 1988, we would only have a 120 day supply of inventory, as far as enrichment was concerned.

Mr. **Luke**. We are working off and have been working off, as I think you know, the enriched inventories for some time.

Senator Ford. Now, how much ore is in inventory?

Your statement said that only 20 percent of the enriched uranium was supplied by this country, I guess, or by—what is it?

Mr. **Luke**. About 20 percent of the current enrichment feed, which is about 35 to 40 million pounds a year——

Senator Ford. Yes, feed.

Mr. **Luke** [continuing]. Is being mined in the U.S. The current mining rate in the U.S. is between 8 million and 10 million pounds per year.

Senator **Ford**. Per year?

Mr. **Luke**. Yes, sir.

Senator **Ford**. Of the 35 million pounds used?

Mr. **Luke**. Yes, sir.

Senator **Ford**. Do we have a surplus? Do we have a storage inventory?

Mr. **Luke**. We have a lot of inventory, yes, sir. We have about 150 million pounds, as I recall in inventory, including all the utility-owned inventories.

Senator **Ford**. So, we have 150 million pounds in inventory, and you produce about how much in this country now—about 6 million pounds?

Mr. **Luke**. We are producing at this time, we are mining about 8 million to 10 million pounds.

Senator **Ford**. Eight to 10 million pounds.

Well, we have heard up to 15 million, maybe 13 million to 15 million.

Mr. **Luke**. Well, the EIA said they expected last year's number to be up from, I have forgotten what they said now, but about 13 million, something like that. But that really is milling.

There have been quite a few companies that have been storing ore to keep the mines alive and active. They store the ore and then they mill it all in one year. So it sort of distorts the statistics a little bit. But there are still mines shutting down today.

Senator **Ford**. So, where we use about 35 million pounds a year for enrichment, we have about 150 million pounds in inventory?

Mr. **Luke**. That is my recollection, sir. I believe that includes enriched uranium as well as natural. It is the equivalent amount.

Senator **Ford**. The equivalent.

Mr. **Luke**. Yes, sir.

Senator **Ford**. We are beginning to get some data here and I think we will need to put it all together.

I have one final question and then I will turn this over to Senator Domenici.

In a briefing paper that GAO, the General Accounting Office, submitted for the record of our committee I guess around July of 1985, they used some data from the Nuclear Regulatory Commission. They estimated that the cost per ton of cleaning up the tailings was approximately $1.36. What is your estimate? Why is your estimate so much higher? I think you made an estimate that was higher than that.

Mr. **Luke**. Senator, we estimate that the current costs for the active sites, which are these Title II sites——

Senator **Ford**. Right. You have made an inventory of all of those, haven't you?

Mr. **Luke**. We have, yes, sir. The companies estimate that the costs will range between about a dollar a ton, or maybe slightly less than a dollar a ton, on the very largest sites, up to above $12 a ton. We think the average cost will be somewhere between $3 and $4 a ton for all of the 190 million tons of tailings in the Title II sites.

Now, the way these costs are actually established is that each company, depending on the specific site circumstances, prepares a reclamation program and plan and submits that to the NRC for review.

Then, once the NRC reviews that and asks their questions and makes the other conditions that they want to place on it—and you realize that they just completed these standards last year; the EPA guidelines and NRC standards were just finally established last year—they will then come back to the companies and ask them to possibly make changes.

So we don't know for sure what these costs are going to be. But the numbers I have given you today are pretty realistic and pretty current.

They add up to a total of about $1 billion for all of the companies.

Senator **Ford**. That was what I was getting ready to say, about $4 for 200 million.

Your bill, I think, contained about $800 million?

Senator **Domenici**. Yes.

Senator **Ford**. Yes, about $800 million. So we are somewhere in that ballpark. The $4 billion scared a lot of us, it frightened a lot of us, because of the cost. Now that begins to look a little better.

But you had site specific studies, am I correct?

Mr. **Luke**. Yes, sir, we do.

Senator **Ford**. At about 190 million—is that pounds or tons?

Mr. **Luke**. Tons of tailings.

Senator **Ford**. I want to be sure of the pounds and tons today. I want to be sure we keep those straight.

I think we are beginning to get closer together, Senator, on what the cost is going to be. Your costs have been consistent and their costs have been erratic, and that is what we basically find as we travel down this path of industry versus governmental estimates.

Senator Domenici.

Senator **Domenici**. Thank you very much, Mr. Chairman.

Mr. Hancock, let me just compliment you. When I asked the government witnesses whether they had ever represented any State that had lost 7,500 miners, obviously none of them raised their hands. While you did not have that many in your union, obviously you have seen thousands of uranium miners that belonged to your union before now no longer employed. You could have stood up and said you were one of those who understood the plight of the miner, couldn't you?

Mr. **Hancock**. I certainly could.

Senator **Domenici**. Mr. Luke, I assume, as the representative of the uranium mining companies, in particular those in my State, had you been at the witness stand, you could have told the story right then and there about New Mexico, with about 10,000 workers at its peak, down to, what, 165?

Mr. **Luke**. Something like that, Senator. I think we both have a lot of good friends in the category of those who are on early retirement or finding other employment now.

Mr. **Hancock**. Or just plain out of work.

Mr. **Luke**. Yes, or just plain out of work. That's right.

Senator **Domenici**. We have heard a lot here today. The distinguished Chairman has accommodated us with a very detailed set of hearings. The only new thing I have heard that concerned me here today, Mr. Luke, and that concerns me greatly—and I wonder if you are recommending that we do something about it—is this. If I heard you correctly, with reference to the defense needs, you were suggesting that maybe this committee, in either an Executive Session or otherwise, should get to the bottom of what the real defense inventories of uranium are at this point in terms of whether or not we are, indeed, secure with our two principal foreign sources, both having prohibitions against any of that uranium being used for military purposes. Are you suggesting that we determine with more certainty what that status really is?

Mr. **Luke**. Yes, sir.

I think, given the DOE's recent statements that they may be considering the further sale of stockpile material and the fact that they are now using it to overfeed the plants again, you know, after the first viability determination—and I think at one of your earlier hearings, they agreed they would not overfeed the plants. It is our understanding that they have now started that practice again, which uses some of the stockpile up as supplemental feed for the enrichment process.

I know this question has come up before and I am sure some of the information involved is confidential. So, naturally, we do not have the data. But if the committee staff has not already looked into this question, I certainly recommend, based on some rather inconsistent information that I have seen over the past few years, that it would be an area of great interest. I think it is one that you have to be extremely specific about with DOE.

Senator **Domenici**. Let me inquire into just two other areas.

You heard me speak to the government witnesses about the situation in Canada. Obviously I do not see any purpose in going back to the Trade Representative of the United States to try to get some help at this point so long as we have a court case pending, which clearly could prevail—then they will have to deal with us—and/or as long as we have the Chairman and this committee willing to consider a comprehensive bill that would solve the problems of tailings cleanup, the overcharges on the books of OMB, and some kind of import limitation imposed by Congress.

But, could you give us a quick version of what your mining industry feels is some evidence of unfair competition from the Canadians that causes you to wonder how they can stay in business and ship the way they are if they are being fair?

Mr. **Luke**. Well, sir, there is no question that there have been some high grade discoveries in Western Canada in recent years, and they have been developed and exported at low costs and low prices, but at the expense of our industry, not at the expense of the Eastern Canadian industry, as you alluded to.

There have been some statements made that the contracts in force have allowed the Ontario mines to stay in production. But, in fact, it is my understanding that all the Canadian contracts, those within and outside of Canada, are subject to governmental review every year. That is one of their practices.

The fact is that is one of the things that would worry me if I were a utility executive, about getting overly dependent on Canadian uranium is that those contracts are subject to annual price reviews.

They also, as has already been mentioned in the hearings, mine uranium in Saskatchewan with government companies, provincial companies and the El Dorado Company, which is the Federal Government Crown Corporation, and they have been financed and supported by the Canadian Government.

They require that all of their requirements for uranium—100 percent—are purchased from Canadian sources before they are even allowed to export uranium to the United States.

We do not even have an opportunity to bid on the Ontario Hydro requirements.

They require upgrading of uranium to uranium hexafluoride before export, and that is a long-standing policy of the Canadian Government.

We feel that, given the clear language of section 161(v) and given the experience the mining industry has had in trying to get this administration to take action in the trade area via the copper situation, it would be an additional and significant expense for us to try to file a trade action and might further even delay the relief that we seek.

Senator **Domenici**. So, when the government witness reminded me that the companies had a remedy also under 301 of the Trade Bill, you are answering that at this point? That is your response?

Mr. **Luke**. Yes, sir.

Senator **Domenici**. Based upon the previous approach of the commission and the government, you would prefer to stick with the lawsuit and tell us your case and see if we cannot do something legislatively. Is that what you are saying?

Mr. **Luke**. Yes, sir.

Senator **Domenici**. I have one last question and perhaps you can submit it for the record, Mr. Luke.

Last year, in your testimony, you stated that domestic usage requirements, as proposed in last year's bill, need to be adjusted in light of recent events.

Will you tell us for the record what kind of adjustments you have in mind?

Mr. **Luke**. We would like to get a little bit more current information. You know, EIA keeps statistics, but they are a little bit late. We are about a year behind on statistics.

I think that to have the same effect as last year's bill, 50 percent, we are going to have a higher percentage this year, to have the same amount of market for the domestic industry.

Senator **Domenici**. And that is because of the additional growth in the long-term contracts since that point in time?

Mr. **Luke**. There have been additional commitments, we think. There has been market slippage, additional reactor slippage. There has been use of the uranium stockpile that we did not think would occur last year. And there has been this trading that we do not fully understand.

I would like to read to you from a March 2 newsletter. This is one of the industry trade publications. It says: "An interesting phenomenon is occurring with the prolonged delay of the producers, lawsuit decision. The demand for U.S.-origin is actually decreasing as U.S. utilities find clever and innovative ways to conserve their U.S.-origin uranium. One way is to fast track the non-U.S. origin material, especially South African, into the reactor by swaps and delivery schedule maneuvers. Another way is to bank U.S.-origin material with another company holding non-U.S.-origin inventory. The result of all of this has been the conservation and increased buffer stocks of U.S.-origin to hedge against the possibility of an embargo."

As you can see, this is a kind of complicated thing right now, and many of these effects are short-term. But we still need to understand them a little bit better.

Senator **Ford**. I might say to my good friend that P.T. Barnum said that there was a sucker born every day. But he forgot to tell us that two people were looking for him. [General laughter.]

Senator **Domenici**. Mr. Chairman, I just want to make one last observation.

In dealing with the mining companies and the labor unions involved as the lawsuit went its way and as we move with our legislation, we heard statements from the Department of Energy that I just want to get on the record, because, I think, knowing of your interest in enrichment, along with the other issues that are here, for which I have already complimented you and thanked you on behalf of my State.

The Department has maintained that even if the Circuit Court sustains the District Court on the import limitation, that will not stop anything because they will just permit foreign enriched uranium to come in, and there is nothing in the degree to preclude it.

Frankly, I believe the judge will preclude that also. We will see to it in the legislation that we reintroduce that you cannot get around that in an effort to get around an American import limitation, because we are going to talk about it in the way it was talked about here at the witness table. We are talking about the material, as it goes for enrichment, not just as they would say it, we'll do as much enriching as we want to and we will import the enriched product, because that would get around the import limitation immediately, and then we would be out of the enrichment business in addition to the mining business.

Is that not one of the threats that has been made?

Mr. **Luke**. I think that is a possibility, Senator. I think the bill, as you introduced it last year, really kind of took that into account.

Senator **Domenici**. Thank you very much.

Senator **Ford**. Thank you, Senator Domenici.

Thank you, Mr. Hancock and Mr. Luke, for being here today.

This subcommittee stands in recess until 9:30 a.m., Friday the 13th.

[Whereupon, at 4:47 p.m., the subcommittee recessed, to reconvene Friday, March 13, 1987.]

DOMESTIC URANIUM MINING INDUSTRY AND THE DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT PROGRAM

FRIDAY, MARCH 13, 1987

U.S. Senate,
Subcommittee on Energy Research and Development,
Committee on Energy and Natural Resources,
Washington, DC.

The subcommittee met, pursuant to notice, at 9:30 a.m. in room SD-366, Dirksen Senate Office Building, Hon. Wendell H. Ford, presiding.

OPENING STATEMENT OF HON. WENDELL H. FORD, A U.S. SENATOR FROM THE STATE OF KENTUCKY

Senator Ford. Good morning, ladies and gentlemen. Today the Subcommittee on Energy Research and Development holds its second day of hearings on uranium issues. We will be concentrating on the Uranium Enrichment Program of the Department of Energy. This program's story reads like the "Perils of Pauline." That might be funny if it did not hurt so much.

A lot of people have put a tremendous amount of effort into this program, and it looks to me as if the leadership and adminstration is literally giving the enterprise away. What we have here is a business capable of underselling its competition in a market that is worth between $2 and $3 billion in annual sales.

DOE's uranium enrichment business could make a significant contribution to our trade balance. We have fully depreciated enrichment capacity that is capable of the lowest cost production in the world, yet more than half of this capacity is idle while the competition, foreign governments, are getting all the business in a growing world market. These foreign governments are now on the verge of taking domestic sales away from all of us and are actively seeking to build their own plants here to take more.

It is popular to talk "competitiveness." In uranium enrichment, we have the lowest cost production in place because we made the investments first. We also have a three to five-year lead in the most promising and advanced enrichment process, the atomic vapor laser isotope separation technology. Yet the adminstration is proposing to stop funding the AVLIS program altogether. So much for competitiveness.

Why is this business flat on its back? By all indications it should be carrying its own weight and contributing good hard dollars to our trade balance. The answer is simple but discouraging: Self-inflicted wounds. There is a lot of blame to go around, and most of it belongs in the Office of Management and Budget. At OMB the idealogues have taken over. Their aim is to privatize. Sell short. Cash in.

OMB has consistently sought to extract the most cash it could get out of the enrichment enterprise to run the program into the ground and then to sell the assets that are left at whatever price they can get. Here in my mind privatization gets mixed up with privateering.

The second problem is the bullheaded bureaucracy. One government agency, DOE, has contracted to buy electricity from another government agency, Tennessee Valley Authority. These are take-or-pay contracts. The demand charges in Fiscal Year 1988 are $550 million. That is $550 million dollars. The need to raise prices to cover these TVA demand charges is the reason DOE's enrichment prices are too high for the market. These demand charges have already forced the closing of DOE's Oak Ridge enrichment plant with a loss of approximately 1,000 employees.

These contracts are a massive mistake. They should be renegotiated because if they are not both sides are going to lose. DOE's enrichment business will collapse, and TVA will not get paid at all.

There is such a thing as rescheduling as distinguished from cancelling debt. It is done all the time, and I believe it should be done here.

We are going to be talking about these issues today, and I urge the witnesses to dispense with rhetoric and get down to the facts. On this committee we are in the business of legislating on these issues. You can help us and be a part of the solution, or you can all go on behaving as you have and remain part of the problem. It may sound a little blunt, but that is the way Ford sees it.

Senator Hecht, do you have a statement to make?

Senator HECHT. I like what you said. I am just going to stop right there. Let us hear the witnesses and get to the facts.

[A statement for the record from Senator Domenici follows:]

OPENING STATEMENT - SENATOR PETE DOMENICI

MARCH 13, 1987, HEARING ON THE DOE ENRICHMENT BUSINESS

GOOD MORNING. AGAIN, I WISH TO EXPRESS MY APPRECIATION TO SENATOR FORD FOR SCHEDULING THESE HEARINGS ON URANIUM AND ENRICHMENT ISSUES SO EARLY IN THE SESSION.

TODAY'S HEARINGS WILL FOCUS ON THE DEPARTMENT OF ENERGY'S ENRICHMENT BUSINESS, AND WHILE FROM A PURELY PAROCHIAL STANDPOINT, I COULD ASSUME A RATHER STAND-OFFISH LACK OF ENTHUSIASM FOR THIS SUBJECT MATTER, I HOPE I DON'T OFFEND MY STATE'S PERSONAL INTERESTS BY SAYING THAT, IN FACT, THE HEALTH OF OUR NATION'S ENRICHMENT ENTERPRISE IS JUST AS IMPORTANT TO ME AS ARE THE URANIUM MINERS' CONCERNS. WE ARE ALL IN THIS BUSINESS TOGETHER: WHAT PURPOSE WOULD IT SERVE TO MAINTAIN A VIABLE URANIUM MINING INDUSTRY IF WE DIDN'T HAVE A DOMESTIC MEANS FOR ENRICHING THE ORE? AND CONVERSELY, WHAT PURPOSE WOULD IT SERVE TO PRESERVE DOMESTIC ENRICHMENT CAPABILITIES IF WE WERE TO ALLOW OUR DOMESTIC URANIUM PRODUCTION INDUSTRY TO DIE?

SO I WOULD REMIND MY FRIENDS THAT I WOULD BE THE FIRST TO ADMIT THAT, FROM AN ENERGY SECURITY STANDPOINT AND A NATIONAL SECURITY STANDPOINT, WE MUST PRESERVE THE VIABILITY OF THE ENTIRE NUCLEAR FUEL CYCLE, OR WE MAY AS WELL GIVE UP OUR NUCLEAR OPTION ALTOGETHER. THERE ARE NOT WINNERS AND LOSERS IN THIS ISSUE. WE ARE ALL IN THIS THING TOGETHER, AND WE'LL SINK OR SWIM TOGETHER.

THAT IS WHY, LAST YEAR, I INTRODUCED A COMPREHENSIVE BILL THAT ADDRESSED AND ATTEMPTED TO RESOLVE NOT ONLY THE MINERS' ISSUES OF VIABILITY AND URANIUM MILL TAILINGS CLEANUP, BUT ALSO THE ISSUE OF RESTRUCTURING OF OUR ENRICHMENT ENTERPRISE TO MAKE IT MORE COMPETITIVE AND RESPONSIVE TO MARKET FORCES. IN FACT, IN ONE OF THE DRAFTS OF THAT BILL, THERE WERE 13 PAGES OF DETAILED, CAREFULLY LAYED OUT LANGUAGE TO ESTABLISH A QUASI-GOVERNMENT/PRIVATE CORPORATION TO MANAGE AND RUN THE ENRICHMENT BUSINESS. I HOPE WE TAKE A REAL GOOD LOOK AGAIN AT THAT PROPOSAL BEFORE WE TRY TO RE-INVENT THE WHEEL THIS CONGRESS.

BEFORE WE BEGIN, I WANT TO RELATE A STORY TO YOU ALL. LAST YEAR, I PERSONALLY SAT DOWN FOR A GOOD LONG TIME WITH WHITE HOUSE CHIEF OF STAFF DON REGAN AND OMB DIRECTOR JIM MILLER. I DESCRIBED TO THEM THE SITUATION WE FOUND OURSELVES IN AT THAT TIME - WITH THE DOE DETERMINATION OF NONVIABILITY OF OUR DOMESTIC URANIUM INDUSTRY, AND WITH THE POTENTIAL NOSE-DIVE THAT DOE'S ENRICHMENT BUSINESS COULD TAKE IF SOMETHING WASN'T DONE SOON TO REMEDY THE SITUATION. WELL, LET ME TELL YOU, I WAS SHOCKED AT HOW UNINFORMED MR. REGAN AND MR. BAKER WERE UP UNTIL MY VISIT. BUT I WAS ALSO PLEASED AT THEIR RESPONSIVENESS AND CONCERN. THEY REALLY WANTED TO DO SOMETHING!

WELL, SO DID I, AND I TRIED HARD, AND I SPENT LONG HOURS UP UNTIL THE BITTER END OF LAST CONGRESS, TRYING TO GET MY COLLEAGUES EDUCATED AND ON BOARD MY BILL. WE ALMOST MADE IT, TOO.

WE CAN SUCCEED THIS YEAR. I AM CONVINCED. BUT MORE IMPORTANTLY, WE MUST SUCCEED, FOR TIME IS RUNNING OUT, AND THE URANIUM INDUSTRY AND THE ENRICHMENT ENTERPRISE ARE IN SHARK-INFESTED WATERS, AND THEY'RE UP FOR THEIR THIRD AND LAST GASP OF AIR, AND CONGRESS IS THE ONLY ONE WHO CAN THROW THEM THE LIFE RING.

Senator FORD. Well, we are going right on with it.

The first witness we have is the Honorable David Rossin, Assistant Secretary, Nuclear Energy Programs, and Mr. Longenecker is accompanying him.

Mr. Secretary, we would be delighted to hear your opening statement. It will go in the record in full. If you want to highlight it, fine. I have a series of questions that I would like to ask.

STATEMENT OF DR. A. DAVID ROSSIN, ASSISTANT SECRETARY FOR NUCLEAR ENERGY, DEPARTMENT OF ENERGY, ACCOMPANIED BY JOHN R. LONGENECKER, DEPUTY ASSISTANT SECRETARY FOR URANIUM ENRICHMENT

Dr. ROSSIN. Thank you, Mr. Chairman.

Senator FORD. That microphone is for recording. We would like to hear what you are recording. That is it.

Dr. ROSSIN. I appreciate your being here and giving us the opportunity in this hearing to discuss the uranium enrichment enterprise. I realize the pressure that you are under with your schedules, and it is very important to us to have this opportunity. So as you suggest, with your permission I am going to submit my statement and depart from that and just make a few observations.

Senator FORD. Without objection, your statement will be included in the record.

Dr. ROSSIN. I am also going to depend on John Longenecker to discuss the status of this enterprise, the progress that has been made, the condition today which is in the short term not all that bad, but we face some serious long-term problems, and I want to outline those for you.

Since I have been here six months and much of my education on this subject has come from John, I am going to eliminate the middleman and allow him to make that presentation directly to you.

We have some serious challenges that must be resolved, and I agree wholeheartedly with your opening statement. What we do not need is rhetoric. We need solutions, so I will turn this over to John promptly, and I will make a few comments at the conclusion of his remarks and save as much time as possible to respond to your questions.

I would just like to suggest that during John's comments there are a couple of things that I think are very important which should be kept in mind. One of the greatest assets of the uranium enrichment enterprise may well be our customers and their long-term contracts that they have with us. Their decisions this year in 1987 affect our business in 1992, 1997 and beyond.

As you indicated, this is a vital national resource which employs thousands of American workers in direct jobs. The fuel fabricators, converters and related industries employ additional thousands of American workers. The revenues from this business are enormous. It is a business that represents over a billion dollars a year in revenues. A substantial amount of that is purchases by foreign companies, and that improves our balance payments.

This is at risk now. If we are unable to resolve the complex problems that we face this year, we run the real risk of losing the uranium enrichment enterprise and related steps in the fuel cycle.

This means these jobs and the income this country gets from overseas customers. I do not want to see this happen. I am looking forward to working with you and the members of this Committee and Congress to try to resolve these questions.

Now I would like to call on John Longenecker, the Deputy Assistant Secretary for Uranium Enrichment.

Senator Ford. Mr. Longenecker.

[The prepared statement of Dr. Rossin follows:]

STATEMENT OF
DR. A. DAVID ROSSIN
ASSISTANT SECRETARY FOR NUCLEAR ENERGY
U.S. DEPARTMENT OF ENERGY
BEFORE THE
SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT
COMMITTEE ON ENERGY AND NATURAL RESOURCES
U.S. SENATE

MARCH 13, 1987

Mr. Chairman, it is a pleasure to be here today to discuss the U.S. uranium enrichment enterprise.

Energy security and national security provide strong motivation for maintaining an efficient, stable, and economically competitive uranium enrichment capability in the United States. Nuclear power contributes one-sixth of our Nation's electric power and is an important option for ensuring that Americans will have an adequate and reliable supply of electricity in the 1990's and beyond. Further, domestic employment and energy security are bolstered by a secure, reliable, and economical supply of enriched uranium -- free of the threat of foreign supply disruptions or price controls. Foreign commercial sales aid in the Nation's balance of trade payments and contribute to the Nation's nuclear nonproliferation efforts through our involvement in the nuclear fuel cycle. Finally, important national security objectives are supported by the availability of a safe, dependable supply of highly enriched uranium at reasonable costs for U.S. naval forces and other defense programs.

ENTERPRISE IS NOW AT RISK

While the state of the uranium enrichment business today is significantly improved from the situation that existed only a few short years ago, the enterprise is now at risk because our ability to successfully compete in the international marketplace is seriously threatened.

In the 1970's, the U.S. enjoyed a monopoly position in the free world as the sole provider of enrichment services. However, by the early 1980's, fierce competition from foreign suppliers of enrichment services and an active spot market created by large customer-held inventories were seriously eroding our sales base. To make matters worse, relatively high operating, power, demand, research, and construction costs and the strength of the U.S. dollar combined to make the Department of Energy (DOE) the world's highest-priced supplier of enrichment services. As a result, DOE's world market share decreased from 100 percent in 1974 to 46 percent by 1985 as DOE customers terminated contracts, in whole or in part, with sales value of about $5 billion.

Despite our success in improving our competitive position since 1984 by introducing the new Utility Services contracts, aggressive marketing, and minimizing the cost of our plant operations, it has become increasingly difficult for DOE to manage the enterprise efficiently. Conflicting objectives, varied interpretations of the Atomic Energy Act, and the interplay of competing special interests have each contributed to the present environment within which basic business issues such as pricing, reinvestment, and reliability of service have become unpredictable. Because of these conflicts, customers have expressed concern that they can no longer depend upon DOE as a stable, reliable supplier of enrichment services. The majority of DOE's customers would like to see institutional changes that would insulate the enrichment business from the influence of non-business factors. Their uncertainty and concern will have a major impact on an estimated $5 billion worth of uncommitted sales opportunities through the end of the century. These are now being aggressively pursued by DOE's foreign competitors who are structured more flexibly to capture this market.

CHALLENGES TO LONG-TERM COMPETITIVENESS MUST BE RESOLVED

The enterprise faces unprecedented challenges that must be resolved now if it is going to continue to provide competitive uranium enrichment services to meet the needs and service requirements of our domestic and foreign commercial customers, as well as U.S. defense programs. Both the long-term viability of the uranium enrichment enterprise and its attractiveness as a candidate for privatization depend upon the favorable resolution of a number of key issues which are currently before the courts or Congress or under review in the Department. These issues include:

- resolution between DOE and the Tennessee Valley Authority (TVA) of the appropriate rates and amounts of demand charges for power not taken and no longer needed, in view of significant changes in the determination of these charges by TVA.

- agreement with Congress on the need to price competitively and on the amount of unrecovered Government investment in the enrichment enterprise to be repaid to the Treasury.
- a favorable resolution of pending litigation that challenges the form of the current Utilities Services contract and the "free trade" policy which allows our domestic utility customers to obtain uranium feed stock for enrichment from most foreign sources.
- impact of the 1986 anti-apartheid legislation as to whether our foreign utility customers may send uranium ore or uranium oxide of South African origin into the U.S. for processing (conversion, enrichment, and fabrication) and subsequent re-export to the foreign utility.

Resolution of these issues, coupled with improvements in the flexibility under which the Government currently manages its uranium enrichment assets, would enhance the value of the enterprise. Our primary objective is to preserve one of the key basic energy industries in the United States. We can and must resolve these challenges now because our failure to do so will likely result in the U.S. losing a secure, long-term domestic fuel supply.

The U.S. enrichment enterprise is not competitive in today's international marketplace even though the current production costs at our gaseous diffusion plants (GDPs) are low. Favorable resolution of these issues would allow us to reduce our prices into the competitive range. If viewed as competitive for the long-term, the United States could hold its current utility customers, and it could win back others.

DOE's APPROACH TO ENSURING LONG-TERM COMPETITIVENESS

As a starting point to assuring long-term competitiveness, there needs to be a consensus reached with this Congress on the objectives of the enterprise. A balanced perspective on these objectives involves energy and national security factors, employment considerations, balance of trade effects, value enhancement for the Government's investment in the enterprise, and our efforts to reduce the Federal budget deficit.

We have engaged former Deputy Secretary W. Kenneth Davis to perform a comprehensive analysis of the enterprise and provide recommendations for its restructuring to the Secretary. Related to this current effort are findings contained in a report DOE recently provided to the House and Senate Appropriations Subcommittees on Energy and Water Development, in accordance with H. Rep. No. 99-1005, that identifies the principal options available on restructuring the enterprise. Under any of the restructuring options, successfully resolving the major challenges to the long-term competitiveness of the enterprise and maximizing the economic strength of the two operating GDPs is essential for our customers to consider the U.S. as capable of meeting their requirements for low-cost enrichment services.

The term "restructuring" is intended to apply to a broad range of options currently being evaluated by the Department, ranging from the sale of some or all of the enrichment capacity to the private sector, or some kind of joint venture, to organizational realignments such as incorporating the Government's assets in some form of Government corporation, which could ultimately be transferred to the private sector. In order to achieve its objectives, restructuring the enterprise would have to deal with pricing flexibility, the unrecovered Government investment, expenditures to achieve operating efficiencies without annual authorizations, and investment in long-term research and development.

We clearly recognize that restructuring the Government's uranium enrichment enterprise in any meaningful way -- and certainly incorporating and/or divesting its assets -- raises legal, regulatory, legislative, and administrative issues that we must address collectively with Congress. A review of DOE's enrichment enterprise by a business advisory panel established in 1984 by three congressional committees -- the Tri-Committee Panel -- has strongly recommended the restructuring of the uranium enrichment enterprise. We are eager to begin to work with the 100th Congress on efforts to restructure the enterprise to assure its long-term viability and enable its orderly transition from Government to private ownership.

Failure to reach consensus on the objectives of the enterprise threatens its future existence. The major asset of the enterprise is the forward value of its enrichment contracts with customers. Customers have begun to terminate these contracts and further erosion of our market share is likely if no action is taken. As contracts are terminated, the value of this important asset -- with serious national and energy security implications -- decreases.

There was a time in the early 1970's when serious consideration was given to privatizing the enterprise. A major concern of both the Congress and the utilities was that a monopoly owner could engage in monopolistic pricing. These days are gone. The enterprise now operates in a highly competitive market. Failure to act now will only result in foreign competitors becoming the suppliers of U.S. nuclear fuel requirements.

Mr. Chairman, I appreciate this opportunity to start this critically important process with the members of this Subcommittee. We plan to advise the Subcommittee of the Secretary's preferred restructuring option once the Department's evaluation is completed and look forward to working with this Subcommittee in the formulation of necessary legislation. My colleagues and I would be pleased to respond to your questions at this time.

STATEMENT OF JOHN R. LONGENECKER, DEPUTY ASSISTANT SECRETARY FOR URANIUM ENRICHMENT, DEPARTMENT OF ENERGY

Mr. LONGENECKER. Good morning, Mr. Chairman. What I would like to do for you is to review the recovery strategy that we have been operating under since 1984 and very briefly recount for you the progress that we have made on that strategy.

DOE's Recovery Strategy Is Working

- **Normalize Supply & Demand: (Phase I)**

  To Stabilize Market

- **Streamline Production & R&D Programs: (Phase II)**

  To Reduce Costs

- **Restructure Enterprise: (Phase III)**

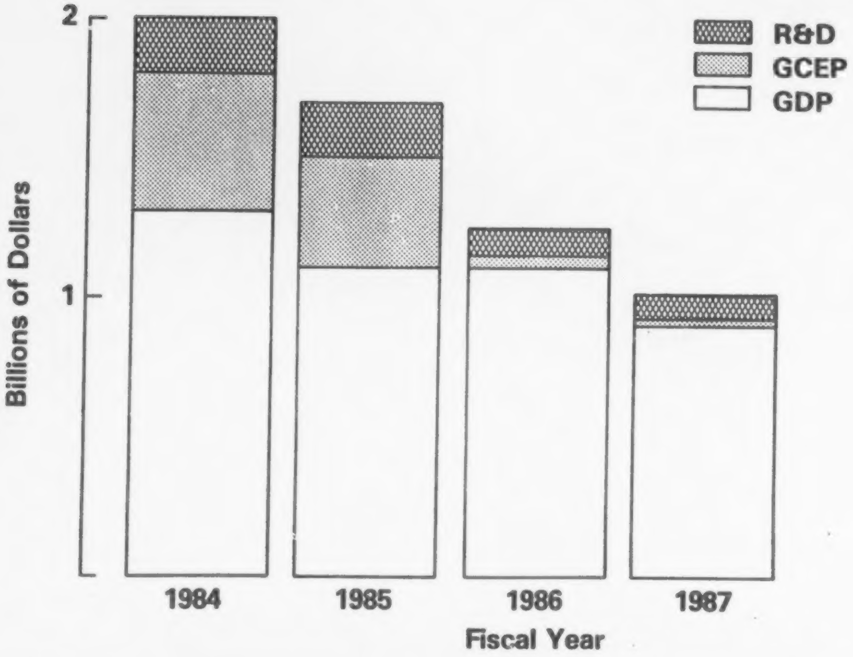
  To Provide Long-Term Stability

In January 1984 we described to you a three-part recovery strategy for the enterprise. The first part was to determine what the demand was that we were going to have to meet in the future. The second part was to get the lowest cost means of meeting that demand both in production in the near term and research and development for the long term. Then the third part of our strategy was to stabilize the competitive aspects of the business after having gotten our costs under control; or to get the institutional part of the business into a form that allows us to maintain long-term stability.

The first part of that strategy was very successful when we introduced the Utility Services contracts and had over 90 percent of our customers convert to them. That determined for us with a rather high certainty what the market was that we would need to meet for the next decade.

Then in the second part of the strategy we made some decisions in 1985 that were meant to streamline both our production and our research and development programs.

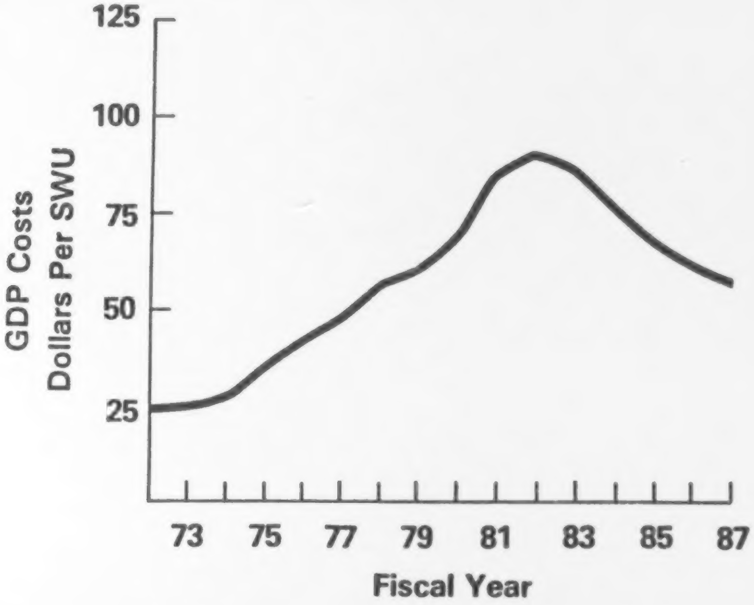
Costs Have Been Reduced by Nearly 50% Since FY 84



The bottom line of this chart is that we have reduced the cost of running this program on an annual basis by nearly 50 percent over the last three years. We have done that by scrutinizing the key elements of our budget shown here in red as research and development, in blue as construction, the GCEP project, and in yellow the cost of operating the gaseous diffusion plant.

From 1984–1987 we have reduced the cost for research and development from over $200 million per year, when we were developing both the centrifuge and the AVLIS technology, to about $80 million per year in 1987. We made the decision in June of 1985 to terminate further work on the GCEP facility, and the residual costs in 1987 are the termination costs associated with that project. Outlays for GCEP were nearly $.5 billion per year in 1984.

SWU Production Costs Are Dropping — Diffusion Technology Is Still Competitive



Finally, with respect to the gaseous diffusion production costs, we have also reduced those costs over the past three years, and that is perhaps one of the most encouraging parts of our strategy to regain competitiveness. We have taken the 30 year old plants and with some very aggressive work from the people in Paducah and Portsmouth, we have reduced the cost of production from those plants through both increased operating efficiencies and wiser procurement of electricity.

Focusing on just that portion of the enterprise, the cost of gaseous diffusion, the SWU production costs are still dropping. Of course, the diffusion technology is what is going to keep us competitive for the decade ahead. You will note that as electricity costs increased throughout the country in the early 1970s through the 1980s, our cost of producing an SWU increased from about $25 per SWU in 1978 to nearly $100 per SWU in 1982.

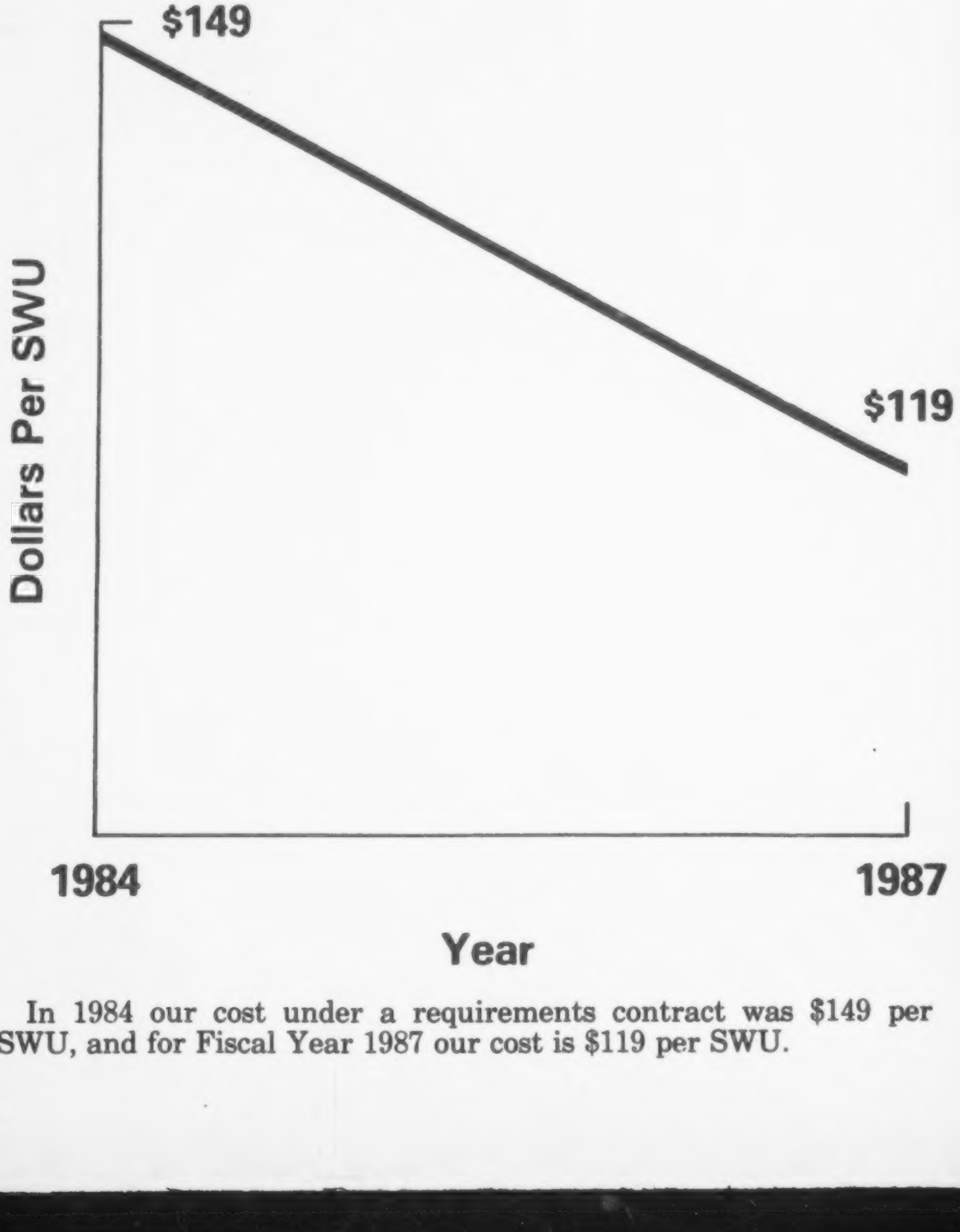
At that point in time, to regain our competitiveness we began switching toward the cheaper sources of power in Portsmouth and Paducah and away from TVA. At the same time, the people in our operating plants devised a means of using cheaper unfirm power both seasonally and during offpeak hours, and this lowered our cost of production to where in 1986 our factory costs were $68 per SWU.

In our 1988 budget, to continue these economies and cost reductions, you will note two construction projects for Paducah that will allow us to continue to reduce these costs. Primarily today we are limited in Paducah by the amount of unfirm power that we can get into the plant either on a seasonal or daily basis. The two projects would involve a switchyard to give us increased access to other generating capacity as well as installing equipment by which we can vary the power of the plant and introduce up to one gigawatt of unfirm power in about ten minutes.

When those capital projects are completed, we estimate that at the two gaseous diffusion plants we will further reduce our production costs by about $6 a SWU, giving us production costs from gaseous diffusion in the 1990s of about $60 per SWU.

All of these cost reductions, of course, have manifested themselves in our ability to lower our price.

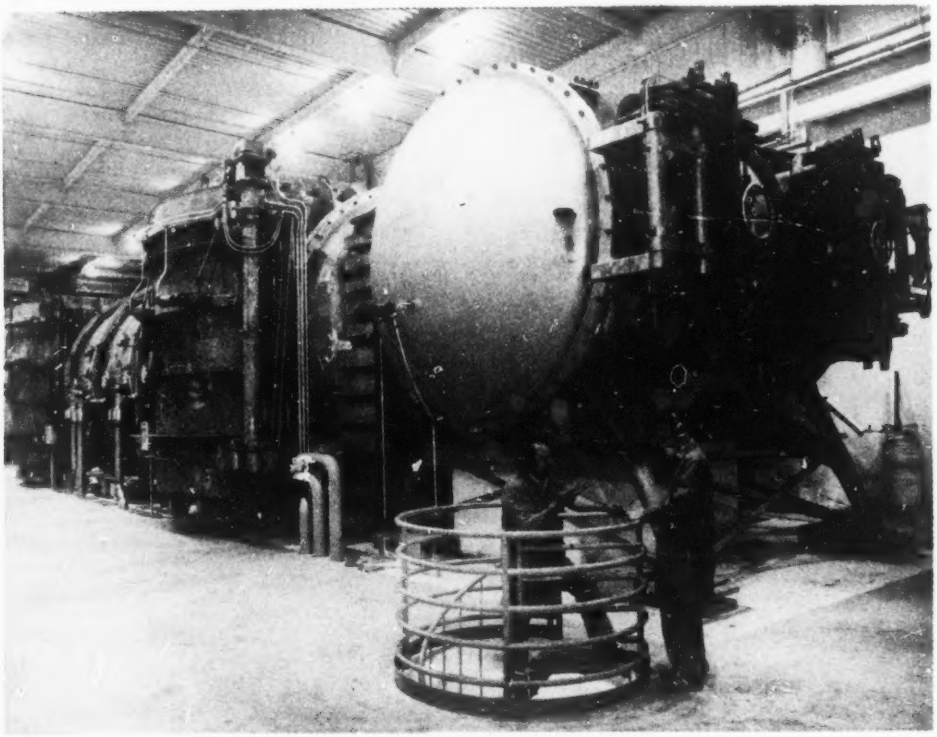
DOE Requirements Contract Price



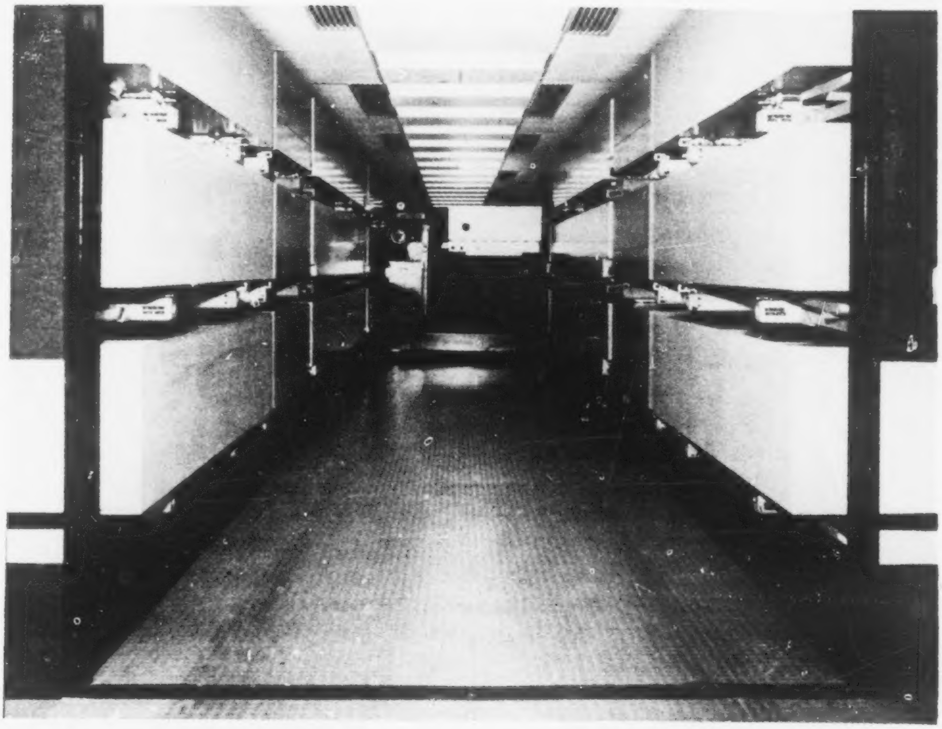
In 1984 our cost under a requirements contract was $149 per SWU, and for Fiscal Year 1987 our cost is $119 per SWU.

Now to provide customers the confidence that we can continue to remain competitive in the long term, we are developing the AVLIS technology. AVLIS, in essence, provides a cap on the cost of SWU prices to customers in the future. I have prepared here a brief recap of the progress we have made in AVLIS at the Lawrence Livermore National Laboratory in the last year and the outlook for Fiscal Year 1987.

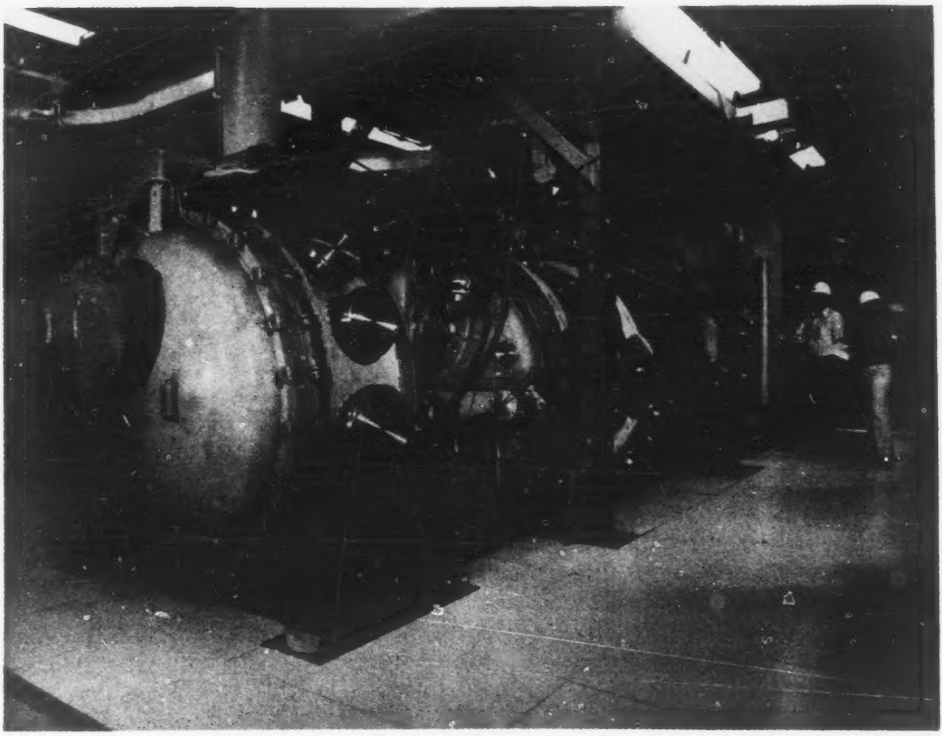
AVLIS Entering Engineering Demonstration Phase



100-Hour Runs Demonstrate Uranium Vaporizer at Full Scale



Laser Output & Reliability Increased Fourfold



SWU's Produced in Mars Prove Physics at Half Scale

Shown here is the full-scale demonstration facility at Livermore. There are three basic elements to an AVLIS plant. There are the dye lasers, copper vapor pump lasers and the separator. Now going in a counterclockwise fashion, you see on this chart the pump laser facility that is the copper laser vapor portion of the system. It is our Laser Demonstration Facility at Livermore.

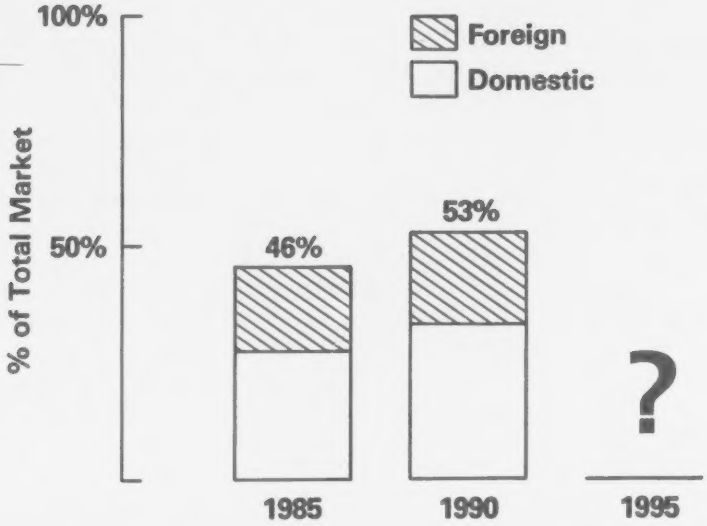
During 1986 the laser output and reliability of LDF increased by a factor of four over 1985. The laser light here is used to illuminate the separator and actually enrich uranium. The Mars facility shown here is a one-half scale AVLIS separator module.

Now just recently, in February of this year, we conducted a long-term 35 hour-plus run at Livermore where we processed over one-half ton of uranium and verified that the process physics are as we had projected them to be. We plan, during the rest of 1987, to conduct additional integrated enrichment runs in Mars and to conduct a 100-hour run of our full-scale separator module shown here during that 100-hour run. To give you an idea of the scale, we plan to process about five tons of uranium.

So to summarize the progress in AVLIS, because it has been very dramatic in the last year, we have increased the output of the lasers by a factor of four. The dye laser system output, shown here, we have increased by a factor of 10. The run time for the integrated enrichment experiment in Mars which I discussed with you earlier increased the run time by a factor of five and the amount of product produced by a factor of 30. We hope to achieve even better technical results as we continue experiments through the rest of this fiscal year.

Now, when all of that is done, the lower gaseous diffusion cost, and the high certainty that gaseous diffusion will have a factory cost in the 1990s of about $60 per SWU, the marginal GAP cost today of about $35 per SWU, as well as an AVLIS technology with an estimated factory cost of less than $40 per SWU, we have been able in the world market to increase our market share between 1985 and 1990.

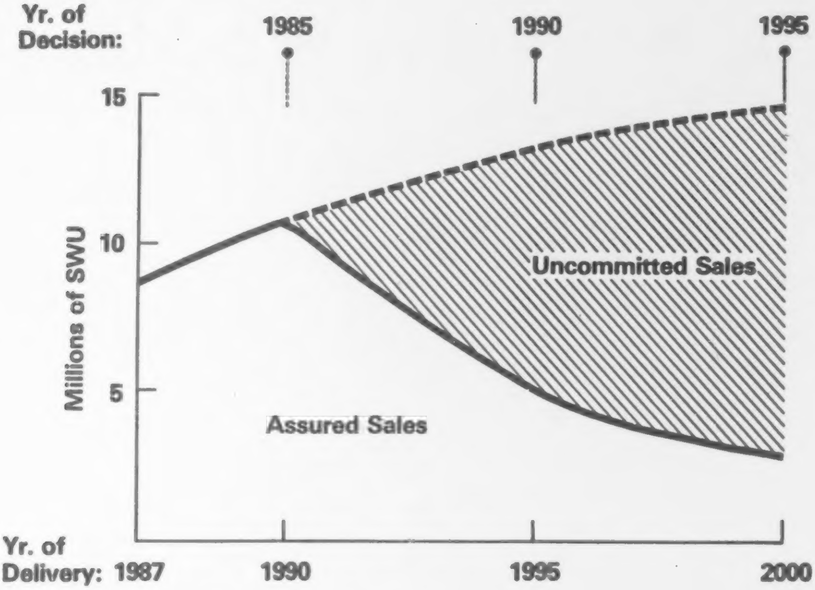
DOE's Share of the Future World Market Is Uncertain



Shown here is a combination of our domestic and foreign sales. We had 46 percent of that market in 1985. Through the combination of lowering our cost base, lowering our prices, and introducing a more flexible contract, we have increased our market share in the free world to 53 percent in 1990.

I should point out that between 1985 and 1990 the free world market is growing by about 25 percent. So we have an increasing share of the growing market. The question, of course, is the future. All these contracts have termination provisions where customers can reduce their deliveries from us by 30 percent in five years and by 100 percent in ten years with no penalty. So they are looking to us today for both stability in our price and competitiveness in our contract terms to determine whether to purchase from us in the long term.

Post 1990 Market Exposure Requires Aggressive Action Now



Now to describe for you what is at risk, shown here on this line is the sales that we would achieve in millions of SWUs, 5 million here, 15 million there between now and the turn of the century if all of the customers that are currently buying from us would continue to buy 100 percent of their needs.

Shown on this line, however, is the sales that could result if customers, due to uncertainty in our price or terms, were to exercise the termination provisions under their contract at no cost to them and go to another supplier.

So, simply put, the white shaded portion of this chart shows the assured sales. The green portion are the uncommitted sales at risk. Again, there can be enough capacity in the world, both primary and spot market, to pick up those sales by the year 2000, and additional capacity can be built abroad. The total market that we could lose amounts to about $5 billion in forward sales.

So providing certainty and stability to the program is crucial to convincing customers that the United States will continue to be a reliable supplier in the future.

Institutional Restructuring Is Needed to Provide:

- **Stability**
- **Flexibility**
- **Reliability**
- **Credibility**
- **Accountability**

That brings us to the third phase of the strategy, that of restructuring. Now our primary motivation for restructuring is to save one of the basic energy industries in the U.S. This enterprise has a low cost base. It has a technological lead in AVLIS over the rest of the world. What we lack is long-term stability in the marketplace.

Institutional restructuring, we think, should give us the flexibility to respond quickly to market changes as well as a framework that is viewed by our customers as reliable and credible. We want to assure that it is structured in a businesslike way so that we are accountable to both Congress, to our customers and that we can assure that the interests of the employees in the uranium enrichment business are protected.

DOE's Report to Congress Identified Several Restructuring Options

- Establish Revolving Fund; Provide Financing Authority
- Transfer Assets to Private Sector
- Create Government Corporation

Congress & Administration Need to Agree on Mission, Goals & Objectives

We submitted a report to Congress in February that identified several restructuring options that we have evaluated. We, of course, looked at the simple option, that of establishing a revolving fund, thus providing self-financing authority for the enterprise. A more aggressive option would be to transfer the assets in the near term to the private sector and totally privatize. A third option would be to create a government corporation similar to a Conrail, to split the business out of the Department of Energy and operate it like a business.

The crucial message that I want to leave you with this morning is that $5 billion in sales are at risk. 1987 is the year where utilities are looking to us, both the administration and Congress, to agree on the mission, goals and objectives of the enterprise and to take some action to provide stability for the future.

We will be providing to you a report at the end of March and giving you our recommendation on restructuring. We look forward to working with you to determine the actual course that the restructuring would take. But, I would underscore that our objective is first to balance the interests of the customers, the employees of the enterprise and the taxpayers, and to obtain in 1987 a clear set of businesslike goals and objectives that will assure stability for the long term.

Senator FORD. Thank you, Mr. Longenecker. We have been joined by several of my colleagues. Do any of you have statements that you would like to make before we begin the questioning of the witnesses?

If not, we will move right on.

Senator BINGAMAN. Mr. Chairman, let me put a statement in the record.

Senator FORD. Without objection, your statement will be included in the record.

[The prepared statement of Senator Bingaman follows:]

STATEMENT BY SENATOR JEFF BINGAMAN
OVERSIGHT HEARINGS ON THE STATUS OF THE DOMESTIC
URANIUM INDUSTRY
March 13, 1987

On Monday, this Committee heard testimony related to the status of the domestic uranium mining and milling industry. Today's hearing will focus on the status of the uranium enrichment program in this country.

As I stated in Monday's hearing, the domestic uranium industry is in a desperate condition. The Department of Energy admits the industry is non-viable. Yet the agency still refuses to act.

A District Court in Denver last year declared DOE's refusal illegal and ordered the agency to limit enrichment of uranium until the viability of the industry is restored. The court-ordered limit amounted to a domestic content of 75 to 100 percent. DOE responded with an appeal.

It is my understanding that the agency claims that it cannot limit enrichment of foreign-source uranium for domestic end use because to do so will effectively raise the price of its enrichment services and drive its domestic customers abroad. I have long been puzzled with this claim. First, the statute says that DOE must act. If DOE does not feel that this is good law, it should come to its authorizing committees for an amendment to the law -- not simply do what it wishes, lawful or not. Second, the Atomic Energy Act on its face provides broad authority to both DOE and NRC to issue orders and regulations necessary to carry out the purposes of the Act. One of those purposes is maintaining a viable domestic uranium industry. If DOE does not wish to use enrichment limitations to this end, then it (or NRC) should take effective and comparable alternative action under the other authorities set out in the Atomic Energy Act.

If DOE were to impose such domestic use requirements promptly, do we even need any legislation to carry out the uranium viability language in the statute, or to maintain a healthy uranium enrichment enterprise?

The U.S. will never again dominate the enrichment market abroad, no matter how low U.S. prices go. At the same time, DOE continues to dominate the U.S. market, because most of our utilities will be reluctant to entrust their enrichment needs over the long term to a potentially politically volatile foreign source of supply.

I believe that DOE will continue to dominate the U.S. market providing one condition is met. That condition is that the U.S. retain a strong and viable domestic uranium industry. If the U.S. loses its raw material producers, nothing is to prevent foreign enrichers from tying sales of enrichment to sales of their material -- just as Canada now does with sales of its uranium conversion services.

In short, I am deeply concerned that the problems faced by the domestic uranium industry be addressed, and I do not believe that the uranium enrichment enterprise can long survive unless a strong and viable domestic uranium industry is promptly restored.

I look forward to the testimony.

Senator FORD. Let us get right down. One quick question. You talk about the AVLIS and you show about how great it is. You have increased stability five times here and 10 times there and 30 times in production. If I am correct, the adminstration's budget zeroed AVLIS out, so you cannot part with any of that blue line out, or are you convinced that we will restore some of that funding?

Dr. ROSSIN. Mr. Chairman, the Secretary of Energy stated that we have not given up on AVLIS. We have problems which have been outlined to you this morning in our statement that have to be resolved. The uncertainty in this business is such that the decision was made to go with the zero budget item in 1988 for AVLIS.

Senator FORD. That was not apparently part of Energy's decision. It went through OMB, and OMB decided that it would not be funded; is that correct?

Dr. ROSSIN. There is one Adminstration, Mr. Chairman.

Senator FORD. Oh, I understand that. I understand that very well. I just asked you a simple question. You say yes or no.

Dr. ROSSIN. It is not a simple question, Mr. Chairman.

Senator FORD. What did you request for AVLIS when you submitted the request through OMB?

Dr. ROSSIN. Our requests are on record. We had requested $80 million for AVLIS in 1988. The final determination was made as a result of a budgeting process which involved a lot of things of which AVLIS is only one, and the final determination was that we would not request funds for AVLIS during Fiscal Year 1988.

Senator FORD. OMB decided you could not do that. Okay.

The committee understands that DOE, in accordance with law, is recovering their costs over a reasonable period of time. For now, however, let us look at DOE's production costs on a one-year basis if we can, and I hope you are prepared to answer this.

For every SWU produced in 1986, what are your factory costs?

Mr. LONGENECKER. Mr. Chairman, I have a chart on that. If I might put it up, we can then speak to it.

Costs of SWU Produced

	FY 86	FY 87	FY 88
● Factory Costs	$ 68	$ 75	$ 97
● TVA Demand Charges	55	81	131
● Repayment	12	32	55
● R&D	11	13	0
Total	$146	$201	$283
SWU Production in Millions:	**7.8**	**6.3**	**4.2**

Our factory costs and the cost of operating the gaseous diffusion plants in Portsmouth and Paducah are primarily electricity and manpower, and for Fiscal Year 1986 they are $68 a SWU.

Senator Ford. $68 a SWU. Then that goes to $75 in 1987 and $97 in 1988.

Then you have the TVA demand charge, electrical charge, and that is $55 this year or $81 next year and $131 in 1988.

Mr. Longenecker. That is correct. All of those units increase because we are dropping production and increasing sales from inventory. We produced 7.8 million SWU last year. We are planning to produce 6.3 million SWU this year and 4.2 million SWU next year. Corresponding sales are 10.4 million SWU in 1986, 11.7 million SWU in 1987 and 12.5 million SWU in 1988. So we are spreading production costs of the DPs over a much smaller base, and that is the reason for the increase.

Senator Ford. As I understood you in your chart a few moments ago, you were reducing the cost of the SWU or the price that you would sell it for. Is that because you are depleting the surplus?

Mr. Longecker. No, sir. The fact that we are depleting the inventories is the reason that the unit costs go up. The reduction in the factory cost of gaseous diffusion to the $68 in 1986 and in the future to near $60 has to do with the work done by the people at Portsmouth and Paducah in operating those plants more efficiently and in the use of cheaper unfirm power.

When we return to a position where supply and demand are in balance, you will see those factory costs return to about $60 per SWU.

Senator FORD. Where your unit price goes up but your price goes down by using your inventory.

Mr. LONGECKER. Yes.

Senator FORD. As I understood the testimony the other day, you would have about four months supply left in inventory at the end of 1988.

Mr. LONGENECKER. That is correct.

Dr. ROSSIN. That amount is a reasonable amount to have in inventory for good management of the business.

Senator FORD. Where did you get your repayment costs. You have 12, 32 and 55. Last year is 12, this year is 32, and next year it will be 55. Explain the repayment cost to me.

Mr. LONGENECKER. That is associated with the Administration's objective of maximizing the repayments in the near term. The repayment amounts that are associated with those are about $91 million in Fiscal Year 1986, about $200 million in Fiscal Year 1987, and about $230 million in Fiscal Year 1988.

Senator FORD. Now we look at research and development, 11, 13 and zero. Is that the AVLIS?

Mr. LONGENECKER. Yes, sir.

Senator FORD. I notice that you are producing even fewer number of SWUs in 1988 and the cost is accelerating tremendously. The demand charge is just going at the top of the thermometer and I do not understand the factory cost—did I understand you to say the factory costs after 1988 will decline? You have so few that you are producing, the overall cost makes the individual SWU price go up?

Mr. LONGENECKER. Yes, sir.

Senator FORD. And after the inventory is reduced then you will increase your production to meet to the 12 million SWUs a year that you say you sell in 1988 so that will reduce the cost per SWU?

Mr. LONGENECKER. Yes, sir.

Senator FORD. It makes it look bad now, though, does it not?

Mr. LONGENECKER. It does indeed.

Senator FORD. It seems to me, to this Senator that DOE is about to fall off a cliff. You are depleting your inventory and the demand charge and repayment costs are a very large portion of your cost of production so the two key problems that must be resolved in this Senator's mind is the TVA demand charge and repayment to the treasury. Do you agree with that?

Mr. LONGENECKER. Yes, we do.

Senator FORD. It appears that we might—well, let us not say might, we could be competitive in the world market, perhaps even, as this Senator sees it, the world leader if we resolve these two problems. Would you agree with that?

Mr. LONGENECKER. Yes, with those low factory costs, and with the technology lead we have in AVLIS, without the TVA demand charge today we would be the lowest priced supplier in the world rather than the highest.

Senator FORD. It seems that maybe both of these problems are caused by the Administration, and they may be self-inflicted. One is the charge, the one government agency paying another government agency where the enrichment plan is paying the TVA and so forth and then the charge requested by OMB or the repayment demanded by OMB to put an extra factor on this, which gets back to my earlier statement. It looks like they are just trying to dismantle it and sell it at a later date, whatever they can get for it. Is part of my statement true?

Mr. LONGENECKER. Our fiscal year 1988 budget clearly states that our objective of maximizing payments to the Treasury in the near term, is driven by a balancing in the Department of the desire to have a healthy business in the long term but the pressing near term deficit situation.

Senator FORD. You made in one of your recommendations—would changes in the enrichment enterprise solve either of these two problems?

Mr. LONGENECKER. Restructuring, per se, would not resolve either one of these problems. These problems, of course, must be addressed. What we do believe that restructing would do, however, is go a long way towards providing some certainty in the future for our customers. Were we in a different structure, a different organizational structure. I think we could have avoided getting to the point where we are today with both the TVA demand charges and the debt.

Senator FORD. In your statement you indicated that you wanted to cooperate with us, and I was glad to hear that open and on the record, but after you want to cooperate, but after you have the results of the study being done by former Assistant Secretary Ken Davis. Did I understand you that that study would be finished by the end of March?

Mr. LONGENECKER. We are planning to reach a point where we can send the Congress a statement that reflects the Secretary's recommendations by the end of March. I am not sure that Mr. Davis's studies will be totally completed, but we believe we will have enough input from those studies so that we can send the Congress a recommendation at the end of March.

Senator FORD. Mr. Rossin, we do not have much time, and we are being squeezed, and I would hope that we could move that along as fast as we possibly can. I do not want to rush it so much that mistakes are made or things are not completed. But I would like to have as much information as I possibly could, and this committee, I think, would like to have that information so we could move on with making a decision, because if we accept the administration's recommendation of zero for AVLIS, then in my opinion based on what you are telling me here this morning, what Mr. Longenecker said in his opening remarks, we could be in real trouble because we are ahead as it relates to new technology. We have charged off in my opinion or should charge off the plank, so we are in a posture as I see it to move right along, so we need to have some information and some agreement as soon as we possibly can. We are moving along pretty—I am taking enough time.

Senator DOMENICI. Would you yield?

Senator FORD. I would be glad to.

Senator DOMENICI. Let me ask this question with reference to this study the former Assistant Secretary is going to or has been asked to run and do for you. I agree with the chairman that it is urgent that it be expedited. We have not, the department has not told him what they want by way of predisposed policies, have they?

Dr. ROSSIN. No, they have not.

Senator DOMENICI. So whether we should proceed with this R&D so we can have new technology even though we are zeroing it out in the policy budget we have been told that is a criteria for his study.

Dr. ROSSIN. We have asked him to take a full, independent look at the uranium enrichment enterprise and make recommendations to the Secretary.

Senator DOMENICI. Thank you.

Senator FORD. I am going to yield the floor. I have got some other questions, and particularly I want to go into detail on the TVA demand charges. I do not want to monopolize the time, and I may run out of time, and if so I am going to be submitting questions to you for answers in writing. Senator Domenici?

Senator DOMENICI. Mr. Chairman, first of all, I do appreciate and want to express the appreciation again for your holding these hearings on the entire cycle. I have a statement that expresses my views that I want to put in the record. But in essence, as you know, Mr. Chairman, and as members of this committee know, I have been concerned about the plight of the uranium mining industry and the mill tailings dilemma out there in the countryside.

One might think that therefore I could shy away from the enrichment problem because we do not have that essentially in our State, but I am totally committed to the proposition that we are in this together. We have got to solve the problem as a package. And we have got to do what America must do to remain a leader in the enrichment process and essentially my statement says that, plus expresses my genuine awe at the state of knowledge that I found in the White House when I went last year to talk to the President's chief of staff about the American enrichment policy, the fact that it was in serious trouble, the fact that we might indeed lose it as an industry and as part of this cycle, and I remain extremely concerned that major decisions are being made by OMB and not by those who ought to be making major policy for this country, and that is essentially what my opening remarks say with a little more detail.

Having said that, might I ask if things continue as they are, are we not in danger of losing our uranium enrichment business as an enterprise?

Dr. ROSSIN. We do run that risk. I am not going to predict that everything will fall apart, but we have outlined the key problems that we feel must be resolved if we can be assured that we are going to have a stable, viable domestic uranium enrichment business. We have a large number of nuclear power plants that are going to need fuel for their lifetime. I think there is very good reason why they ought to depend on assured domestic supply of fuel, and that means domestic supply of enrichment services as well.

Senator DOMENICI. Well, I think we are going to have testimony here today from Duke Power. Are they a big customer?

Dr. ROSSIN. Yes, they are.

Senator DOMENICI. I think we are going to hear their chief executive officer say, and I hope I am wrong, but I think we are going to hear him say if this does not stabilize quickly he sees no reason for Duke Power to continue to enter into contracts for American enriched uranium, that the overseas market is stable, they are moving ahead with new technology, indicating a recognition that the prices can come down in the future, and our contracts have not been as stable as they would like them. If Duke Power and a few others are saying that, does it not concern you as to whether or not we are going to be able to hold onto our enrichment business?

Dr. ROSSIN. Yes, Senator, it does.

Mr. LONGENECKER. They have expressed that opinion to us as well, and as I said earlier, the utilities are looking for some action from us, Congress and the administration, this year to provide some long-term stability to the business. I would hope that they believe that we had the ability to price competitively. The question they have is whether the policies and the infrastructure wrapped around this business will allow us to compete in the future. The amount of funds that are at risk for them in the buying of nuclear fuel for their plants is very high, so we understand their concern. We would project that decisions made within the next year by the utilities could put over three-quarters of our future sales at risk. So the future of the enterprise is on the line in 1987.

Senator DOMENICI. Let me ask on that chart that you put up in response to the chairman's questions, you have $32 in there in 1987 in payment. That is an extremely controversial issue. If I read the current state of the law correctly, you cannot charge that this year, so I assume that number is what you would charge if you were permitted this year to accumulate that kind of money to apply to the alleged $3.5 billion debt. If I am wrong, would you please clarify what it is?

Mr. LONGENECKER. This is a slightly different number. This is a cost rather than a price number, Senator Domenici. This figure is calculated by taking the repayment target for Fiscal 1987, $200 million, and dividing it by the SWUs produced. So it is a measure on every SWU produced of the repayment burden. That is $32 this year. It is not that $32 of our price this year is targeted for repayment.

Senator DOMENICI. I know the chairman of the full committee has visited and plans to visit again the European industry, in particular France. I understand France is doing an excellent job with reference to enrichment and with reference to moving ahead with technology and are extremely competitive in the world market in terms of enrichment.

Is that correct?

Mr. LONGENECKER. Yes, sir.

Senator DOMENICI. I understand the Soviet Union is moving ahead with new technology and are extremely competitive, and might be more so. Is that correct?

Dr. ROSSIN. Well, they are not only competitive, both in their existing technology and their plans for future technology, but as with many other commodities, when they have the need to raise hard currencies they are willing to enter the market at much lower prices than anyone else, and we have had reported in the last year offers by the Soviets to sell in the $70 per SWU range, so they are quite a formidable competitor, and stand willing to meet anyone's needs at a very low price.

Senator DOMENICI. Last year when we put together at the end of the year the comprehensive bill we spent a great deal of time with members here and experts putting together this quasipublic corporation modeled after Conrail and other entities that we have established, that were successful in this country.

First, have you studied that?

Mr. LONGENECKER. Yes, sir, we have.

Senator DOMENICI. Second, do I read the position of the administration to be privatized and profitized instantly or immediately?

Mr. LONGENECKER. We are still looking at a number of options. The key issue that we are evaluating, Senator, in restructuring is how to make it a competitive business because obviously no one is going to buy it unless it is a profitmaking entity. So in any restructuring, the first objective, we believe, ought to be to keep this business competitive. Then the secondary issue, is who owns the equity. We do believe, and it is the Administration's position that any restructuring should have the ability to have private equity ownership in the future and private sector business-like management.

Senator DOMENICI. Let me interrupt and get on the record so we know. We have extremely old plants regardless of the situation in terms of competition the world. Plants as old as the ones we have clearly need to be modernized in terms of technology. Is that not correct?

Mr. LONGENECKER. That is correct.

Senator DOMENICI. Second, there is no way that the private sector would bid very much money for the existing plants and take them over in the short term, in six months or a year, is my assessment of the situation. Would you agree with that?

Mr. LONGENECKER. I would agree with that. I think the responses that we got from the private sector last year when we asked for expressions of interest reflected that. However, I would point out it is not because it is not a potentially profitable business. It is because of the institutional problems in the past history of those old plants, what liabilities they would have to assume.

Senator FORD. A liability of approximately $8 billion that is hanging out there gives them pause for thought, does it not?

Mr. LONGENECKER. Probably the biggest hurdle they have today is NRC licensing. If they were to buy it they would need to license it, and there are no existing licensing regulations for uranium enrichment facilities.

Senator DOMENICI. We have a debt we have not settled. We have environmental problems of a very serious nature. We have licensing, and we have retroactive potential liability that the government is somewhat more immune from than the private sector might be.

You add all those up and it appears to this Senator we would be going through a useless prospectus to ask the private sector to take that over, take it off our hands, and pay us some money for it. Frankly, I think they would ask us to give them some money for taking it over, but in any event that is only my observation. So if we are going to move to some new structuring it has to be done carefully. Is that not correct?

Mr. LONGENECKER. Yes, sir.

Senator DOMENICI. And it cannot go from where it is to instant privatization and work. Is that correct?

Mr. LONGENECKER. That is correct.

Senator DOMENICI. Thank you.

Senator FORD. Senator Johnston.

The CHAIRMAN. Thank you.

Gentlemen, I am trying to get up to speed on this issue, and I was a little bit late today, so I hope I do not ask anything too elemental or that has already been said, but first, let me say that this is a business, as I understand it, of a worldwide market of about $2.5 billion. Our sales now are about $1.3 billion. We used to dominate the market. We are quickly losing it, and if we do not do something radically different from what we are we are going to lose it. I can tell you that that is not going to happen on our watch or on my watch at least without suggesting some alternatives. For us who invented the technology, who are on the cutting edge of all of the best technology in this area, to lose this market is just whacko, and it is not going to happen, I do not believe, at least not if this committee has anything to do with it, and I think we do.

Secondly, the idea of privatization, I think, ought to be dismissed out of hand. Of course, it is a profitable business. Of course private enterprise could make money on a level playing field, but this is a highly competitive business and the competitors are governments, and what private people are going to invest to compete against some government who in turn will give whatever infusion of cash is necessary to grab the market? Private people are just not going to do that, and we might as well face the fact that you have got to have government support. I mean, you are trying to strangle this thing with government obligations at this point. What we need is some government support.

Now, third, it seems to me perfectly plain when you look at those figures that that dog will not hunt, as they say. You have got to have factory costs of about $97 to be competitive or $100, as I understand it, and you have got TVA demand charges. and repayment charges, both of which are a little artificial. They are artificial because if this were a private market you would run this thing through bankruptcy, get rid of those debts, and start over again, but it is not private, so you say, well, somehow to satisfy OMB, which does not understand this market, I am quite sure, we keep those figures on the board.

Now, you have got to erase those figures. What we do with respect—that does not mean we let TVA go belly up, but at least we have got to separate that debt from the uranium enrichment business. It seems to me that some kind of quasipublic corporation or public corporation, one of the two, is the only feasible way to do that. I do not know how we recognize that debt. I guess we just renegotiate the debt with TVA, recognize it as as Federal debt, and let the corporation go on its way. Why should we not do that?

Dr. ROSSIN. You have laid out a complicated scenario, Senator, and I think that illustrates why we are working so hard on these studies, to try to figure out just exactly what we can and cannot do. I would like to study your scenario and comment on it, but basically the idea of establishing a government corporation would be to try to deal with exactly those things without declaring bankruptcy.

The CHAIRMAN. I do not know what kind of freedom you have from OMB to recognize that. Maybe you do not. I mean, to get rid of those TVA demand charges. I mean, we cannot act as if it is bankrupt and leave TVA holding the bag because TVA relied upon another government agency, but at the same time we cannot strangle this business because we will kill the goose that laid the golden egg, so we have got to get rid of those charges. Now, if OMB will not let you negotiate with us we will just have to come up with legislation on our own.

The same thing for this repayment. As I understand this repayment question, you end up with that 55 by a tortured interpretation of the law which says you take into consideration all the appropriations made to nuclear energy but not the offsetting revenues. Am I correct on that?

Mr. LONGENECKER. Senator, it is not quite that simple, but it does derive from the noncommercial sense of our accounting practices. The unrecovered government cost is, in essence, a measure of the asset worth of the business. And as such our policy as described by the administration beginning last year was first to get as much of the government's equity out of the enterprise as we could, as much of that $3.5 billion over the next 20 years and return it to Treasury, and then to try to stimulate the private sector to enter the business and to take over the conduct of uranium enrichment supply. So what you are seeing here, is not strictly a debt—it is something on our books called an unrecovered government cost. It is essentially getting the government's equity out of the business.

The CHAIRMAN. If you sell the inventories and shut the plants down you are just giving away the business in those American jobs. It is a very complicated business, but the end result if we end up giving away an American industry by however we call it, whether it is recouping government investment or under whatever rubric we have it, it still amounts to giving away American jobs, and we just cannot allow that to happen.

Now, fine, we understand there was competition between the AVLIS, the laser technology, and the gas centrifuge, and that the AVLIS won hands down even though they complained about having to shoulder all of their R&D costs in their numbers. They complained about that, but in any event they still won. Is that correct?

Dr. ROSSIN. Yes, sir.

Mr. LONGENECKER. All of the comparisons were done on a cost to go basis

The CHAIRMAN. And you think they can produce about $40 per SWU?

Mr. LONGENECKER. Our current estimates are in that range. Yes, sir.

The CHAIRMAN. How long does it take us to get there? And I do not want to go so fast as to not keep Paducah open and running well for many years, Senator Ford, but in the meantime we want to be highly competitive. When do we get to AVLIS and what are our plans to get there?

Senator FORD. I might just say to the Senator that Paducah is the most efficiently operated plant that they have. I think Mr. Longenecker said a few moments ago because of the employees and because of the improvements Paducah plant is keeping us at the rate we are now. So, yes, I am interested in it, but we do have something that really works. I want to get that lick in. Everybody is talking about employees here this morning. If anybody has any doubt out there, Paducah is in Kentucky.

The CHAIRMAN. I want to keep Paducah alive and well, but in the meantime get in the business of AVLIS, because as I understand it the Japanese have gotten our technology and are going to be moving quickly into that. Is that right?

Mr. ROSSIN. My understanding, and I have been educated a lot on this subject over the last several months, is that we have as much as a five-year lead on the rest of the world as far as the state of our AVLIS development, three to five years, maybe as much as five-year lead.

The CHAIRMAN. I talked to some of the people from Livermore the other night who do not think it is that long. They think it is two years.

Dr. ROSSIN. That is news to me, but nevertheless we feel it is going to require four years of solid research and development work and that work is scheduled to be done at Livermore to bring this process to the point where it is demonstrated at the scale required to attract private investment, and that same scale would really be required if the government were in the business at that time for government to commit to building full-scale plants.

One thing about AVLIS is that you do not have to build a complex the total size, the final size of the whole thing all at once. You can build it in modules. But to commit to full-scale construction of AVLIS modules we believe you have got to have about that four years of research and development and have it succeed before we can make those kinds of commitments. And then you are talking about several years before you have the whole thing up and running. Certainly if we want to have that capability up and running by the turn of the century we will have to keep our R&D program moving.

The CHAIRMAN. Let me ask one final question. Can we mandate an American mining market for uranium in some percentage and be competitive in the world if we restructure this thing properly?

Dr. ROSSIN. I do not now how to do that.

The CHAIRMAN. I can tell you how to do it. Just say you cannot reprocess unless it is certain percentage. I mean, you cannot enrich unless it is a certain percentage of domestic or that you cannot put away the waste unless it is a certain percentage of domestic. It is easy to do. The question is whether we should do it.

Dr. ROSSIN. The problem is, if you do that, American utilities are free to buy not only their enrichment services but the uranium overseas.

The CHAIRMAN. Unless we prohibit it. The question is, can we be competitive if we do that.

Mr. LONGENECKER. Probably yes, there is some percentage—I would not want to speculate what it is—that you could set. There certainly are economically recoverable deposits of uranium in this country that can be sold at competitive prices to utilities here. I would not want to speculate on what that number is, but there is certainly some percentage of those indigenous deposits that are economically recoverable.

The Chairman. I think we ought to have a study and get advice from you as to what the percentage is, because I think we ought to—I think here is a national security, national economic interest in having at least part of our supply in the United States if we can do it. Again, we do not want to saddle our industry with such a burden that we kill it, but to the extent that we can be competitive and have a domestic mining industry, I think we ought to, and I think we ought to try to figure out what that percentage is.

Mr. Longenecker. The solution has to be comprehensive. Of course, our concern about putting any import restriction on any commodity, relates to what that means as far as corresponding actions by other countries. But economically, as you say, there may be a case to be made for it.

Senator Domenici. Mr. Chairman, let me suggest we have done that. We have furnished it to the committee. Essentially if you assume that the repayment is anywhere close to what the federal government is saying, which is currently imposed on the industry and in turn it is making it very unpredictable because one year it is on, the contract is out, they say it is included and then the court says it is not, and then we put a prohibition against them charging it. There is a clear indication that part of that equation is the reduction of that debt—I should not even call it a debt—the "alleged recoupment" from about $3.4 billion to what most people think it is, which is about $350 million. If you phase that into the equation with an import limitation the industry in the United States can buy the enriched uranium and it would be extremely competitive for the cycle that we would be looking at—20, 25 years. I do not think you can go much beyond that. But we have that kind of information.

The Chairman. Actually, we do not have to put a limitation on imports. As I mentioned, we can just say you cannot put away waste that has a higher percentage of foreign fuel at a certain percentage.

Senator Ford. Is the Senator talking about something like a local content law?

The Chairman. For waste disposal, you have got it. I mean, you can do it that way.

Senator Domenici. There is more than one way to do it. The problem is, Mr. Chairman, we are apt to as a nation be confronted with a court decision that says we cannot import any more uranium under existing law, and I think as I said in my opening remarks, while that is my most parochial interest, I cannot believe that we are going to solve any of these problems singularly. I think we have got to solve the problem of the mining industry, the problem of remaining competitive in the enrichment area, and we have got to decide whether or not the uranium companies are going to have to clean up the mill tailing sites which they did not think they had to clean up under the current standards when they started all this out years ago and now a third of which is government, and now they are broke, and if we put a package together that solves all of those I think you can still come up with a very competitive price for the enriched uranium from what we know.

The **Chairman**. That should be our object.

Thank you, Mr. Chairman.

Senator **Ford**. Thank you.

Senator Hecht?

Senator **Hecht**. No questions.

Mr. Chairman, what is your wish? Are we going to adjourn at 11 o'clock for the swearing in of the new Senator, or are you just going to continue?

Senator **Ford**. I wish the new Senator well. I did not have many people there when I was sworn in. [General laughter.]

Senator **Ford**. So I will let you go and watch him and I am going to continue to try to enrich uranium here this morning.

Senator Evans.

Senator **Evans**. Thank you. Let me turn to two things which have been alluded to and which I think are obviously a source of our problem, both the TVA demand charges and the repayment program. Is it true—let us take the whole period of time from the 1960s or—let us look over the last 20 or 25 years. Is it not true that the appropriations and the revenues in this whole system have been approximately equal during that period of time?

Mr. **Longenecker**. By one calculation the appropriations have exceeded the commercial revenues over the period since 1969, when we began commercial enriching by some $100 million. Imputing interest on that amount at the rate of Treasury borrowing which existed at the time would bring you to roughly the $350 million number that was alluded to earlier. So there have been net appropriations.

Senator **Evans**. Let me be very clear on this. The excess from civilian revenues.

Mr. **Longenecker**. That is correct.

Senator **Evans**. So the total appropriations on the one side and civilian revenues on the other are about a $100 million difference, and you have your imputed interest on that. That relates to what size of total revenues and total expenses over that period of time, in other words, by how much, what percentage is that excess, a big amount or small amount?

Mr. **Longenecker**. It is a very small amount. The total revenues in that period exceed $15 billion.

Senator **Evans**. To my original question, the answer is yes, the appropriations and revenues are essentially equal during that period of time?

Mr. **Longenecker**. They were essentially equal. But, hundreds of millions of dollars it is still a big number.

Senator **Evans**. During that period of time, were the benefits solely for those civilian agencies, the utilities, or were there others who received benefits during that period of time?

Mr. **Longenecker**. That is rather a difficult question to answer. It requires a value judgment. The military, of course, derives some benefit from our being in the commercial business because that drives the unit cost for them down. The rest of the nation derives economic benefits from having the business. We have balance of trade benefits, since we exported about a half a billion in services last year.

Senator EVANS. Let us not get into the esoteric. Let us get to the business itself. We had a business that cost so much to operate. That is the appropriation apparently. And then so much revenue came in, and the two were essentially equal. How much of the service provided or the product of enrichment went to those civilian utilities who got the services, 100 percent? Or were enrichment services provided to the military?

Mr. LONGENECKER. The military is currently 15 to 20 percent of our total demand.

Senator EVANS. Has that been essentially the same during that period of time?

Mr. LONGENECKER. Historically it started out much higher, and it has decreased through time.

Senator EVANS. Taking that same period of time in which we were just talking, during that period of time what would have been the average military usage of those enrichment facilities?

Mr. LONGENECKER. I do not know that number precisely. I will provide it for the record.[1] My guess would be no greater than 25 percent.

Senator EVANS. Let us say 25 percent. That is a good figure. It seems to me that those who assert if you had a appropriations on one side and revenues on the other from civilian sources which were approximately equal and 25 percent of the output of that plant is enrichment services for the military, the military essentially is getting their services for free. Isn't that correct?

Mr. LONGENECKER. They have not been getting them for free. They do obtain them at a discount because they do not pay either imputed interest or depreciation, and they do derive some economic benefit from us being in the commerical business. We do not calculate that imputed benefit, but it certainly is there. I just cannot put an economic value on it.

Senator EVANS. I am either pretty dense or it seems to me that the answer is, they get it free. Is there any other cost that goes into the operation of these plants? Let us just take the box here that is represented by the operation of the uranium enrichment. It costs so much to do it and you get so much revenue from those who receive a service. Now, if in fact the appropriations are the cost of accomplishing uranium enrichment and they are so much, and on the other side there have been revenues from civilian customers that are essentially equal to that, and yet 25 percent of the output is for military purposes, tell me how it can be anything other than essentially free material for the military.

Mr. LONGENECKER. If you look at our budget you will notice that there is a military revenue line. The Department budgets under our Defense Programs account for an appropriation for defense related enrichment needs. Now, they have not always done so. That practice was started in the early 1980s.

Senator EVANS. That is what I understand, fiscal 1983 and fiscal 1984 at a bargain rate. Prior to that time was it free?

Mr. LONGENECKER. It was, Senator, but those military costs do not show up in our rate base. What we do in calculating the price for customers and in demonstrating our cost recovery in accordance with the Atomic Energy Act, is to account for the cost of providing defense services. If you will, we impute the revenues that they would have provided. That amount comes out of the rate base and therefore is not directly charged to the commercial customers.

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[1] Not provided for the record.

Mr. ROSSIN. The military does pay for other costs, in effect pays for the cost of the power and the cost of the operation of the plants.

Senator EVANS. Does the military pay for their share of the so-called governmental investment that you are now trying to charge or is it part of the cost of SWU's for the other customers?

Mr. LONGENECKER. We do not charge them imputed interest or depreciation merely because they are another Federal agency. Or to put it another way they do not pay commercial rates.

Senator EVANS. It seems to me it is patently and grossly unfair under those circumstances to assert that somehow there is a huge debt out there that the civilian customers for uranium enrichment ought to pay, and to me it makes no sense at all nor is it justified to say, well, just because it is two governmental agencies operating that we do not have to pay, and then go ahead and charge the full cost to someone else when there have been clear benefits received by the governmental agency, in this case by Defense, in the uranium enrichment process.

In other words, I think OMB's concept that there is somehow an $8 billion debt hanging out there that someone else owes is pure hogwash. What is the attitude of the Department of Energy on that?

I know what OMB's attitude is, and I am sure that they push it back on you and say that is the message that you send. Do you independently as representative of the Department of Energy believe that is the proper allocation of cost?

Dr. ROSSIN. Senator, we have argued this point out. Much of this arguing was done before I joined the Department. I know that the argument was intense, and once a decision was reached on that, the Department and the other parts of the Administration stand by that agreement.

Senator EVANS. On occasion, however, I have had representatives of the administration testify as to their own belief, to the validity of something, even though the administration has—sure, I know you are going to support the position that OMB takes. It is a tough job, is it not?

Senator FORD. Silence is golden. [General laughter.]

I have a couple of quick questions. They may not be as quick as I want them to be. And then I have several questions I would like to submit to you in writing. And then if Senator Johnston doesn't have any further questions we will then go to the other witnesses.

It is my understanding—give me a yes or no on this. I understand that you feel you have a solution or some solution that would lower the demand charge to you without raising TVA rates in the region. Is that correct?

Mr. LONGENECKER. We have been discussing such solutions with them, yes.

Senator FORD. Mr. Longenecker, would you submit that to the committee in writing, and we will not get into that now.

[The information follows:]

TVA could pursue any of a number of alternative measures which could result in lowering DOE's demand charges while avoiding the need to revise rates to their other customers. These measures may require TVA to adjust their current method for determining annual revenue requirements and to finance a greater share of their construction program through borrowings. DOE believes these measures are consistent with generally accepted ratemaking techniques and are within TVA's authority to implement. These measures include:

- Capitalization of costs of idle nuclear plants

  Although TVA has had its five completed nuclear power plants shut down for almost 2 years, costs associated with those plants are being recovered through current rates. Some of these costs currently being considered as operating costs could more appropriately be classified as capital improvement costs to be recovered later through depreciation charges. Therefore, given the extended down time for these plants, the fixed charges relating to these plants could more appropriately be deferred until the plants resume operations.

- Capitalization of Interest Costs

  TVA's rate structure is designed to generate sufficient cash to cover all interest costs relating to its construction program. Although this approach is supported by TVA's interpretation of its Bond Resolution, a less conservative interpretation would conclude that all construction related interest can be capitalized and recovered through depreciation charges once the plants begin operation. This approach, which is followed by many other utilities, permits an appropriate matching of costs with plant operations, and would lead directly to reduced near-term revenue requirements.

- Reduction in Margin Requirements

  Current margin requirements appear to have been set at a level which accounts for about $450 million of TVA's 1987 revenue requirements. The option DOE believes is available to TVA is to to reduce or eliminate that level of margin in order to keep current rates down.

Senator FORD. One other question to add to that. If TVA would take the accounting changes that you propose or that you recommended, would they be consistent with standard utility practices?

Mr. LONGENECKER. Yes, they would. The basic accounting principle that we are talking about is charging the costs for plants under construction that will be used by people long after we are off the grid to those users rather than expensing them to us. To put it another way, rather than extracting the money from us through demand charges, TVA would obtain them by financing the cost of future construction from borrowing. That is a rather standard utility practice.

Dr. ROSSIN. The Department recognizes that contracts were written many years ago that include demand charges, and we are not arguing that we should be released from all demand charges. We are debating the level of those demand charges, the dollar amounts and the way in which they were determined. That is what the Department and TVA are discussing.

Senator FORD. Fine. We have that, I understand, from you in writing. That will be sufficient for me.

Now I want to get into one other question. The estimates I have heard of the debt, that is one—the demand charge and the debt and the payment of that are the two major questions we have. Now, the estimates range from $7.5 billion in GAO's opinion to $350 million in the utilities' opinion with OMB's number somewhere in between that maybe.

Can you explain the difference between the GAO and the OMB numbers, and about the differences between these numbers and the lower $350 million figure?

Mr. LONGENECKER. The GAO estimate is one that is taken from our financial statement at the end of Fiscal Year 1984. Basically it is a value of the assets at the end of that period assuming that the GCEP plant and all three gaseous diffusion plants are used and usable. The $3.4 billion removes from that estimate, as of the end of Fiscal Year 1984, 60 percent of the gaseous diffusion capacity and most of GCEP. So the $3.4 billion reflects the fact that neither GCEP nor the Oak Ridge gaseous diffusion plant is used or usable.

The $350 million number that you quoted is in essence a net appropriation plus imputed interest for the amount by which the actual outlays for commercial purposes exceeded the actual revenues received from 1969 through 1984. So two of the estimates are unrecovered government investment or asset values. One has GCEP and three GDPs in it. The other takes GCEP, or most of it, and one of the GDPs out. The third is really a cash flow calculation, net appropriations, if you will.

Senator FORD. There is a real debt question here and I think we all understand that. That is about the only thing I know is my checkbook. And I would know it in our personal finances as the amount by which our costs exceed our revenues.

Then the definition of the enrichment debt is the difference between the cost of commercial operations and the commercial revenues, and that would be $350 million. Is that correct?

Mr. LONGENECKER. Under your definition of the debt that number through the end of 1984 is about $350 million.

Senator FORD. I understand that you have reviewed these utility calculations. Are the figures used in arriving at the $350 million number consistent with information in your financial statement or your program records?

Mr. LONGENECKER. They are consistent in all but in one respect; and, that is in the allocation of civilian and military costs before 1985, when our accounting records did not allocate those costs. They were kept in a single entry for both military and civilian production. So, except for the allocation of the military and civilian costs prior to 1985, those numbers came from our financial statements.

Senator FORD. If you include the data through 1986, what does the $350 million become?

Mr. LONGENECKER. Through the end of fiscal year 1986 the calculation based on the same assumptions would be about $364 million.

Senator FORD. About $14 million for two years?

Mr. LONGENECKER. Yes, sir. That reflects the net appropriation we received in 1985 and a positive contribution of $91 million to Treasury in 1986 in excess of our outlays.

Senator FORD. Would you submit that schedule and so forth for the record?

Mr. LONGENECKER. Certainly.

[The information follows:]

UNRECOVERED GOVERNMENT INVESTMENT IN URANIUM ENRICHMENT

($ in Millions)

	EEI*	Administration	GAO
1969 Beginning Balances	0	1500	1500
Net Cash Flow	1600	1600	1600
Adjustment for Unfunded Government Deliveries	(1470)	(1200)	(1200)
Imputed Interest	220	5600	5600
Subtotal	350	7500	7500
Adjustments	0	(4100)	0
TOTAL	350	3400	7500

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*Edison Electric Institute (EEI) represents the opinion of its member utility companies.

Notes:

1. This table was prepared by DOE to assist in understanding the conceptual differences between the EEI, Administration, and GAO estimates. Such categories of costs have been grouped to highlight differences while fully recognizing that these costs are categorized differently on the uranium enrichment financial statements.

2. The beginning balances represent costs which were incurred prior to 1969 that were allocated to be recovered from the sale of enrichment services to commercial and Government users after 1969. The $1.5 billion consists of about $1.0 billion in undepreciated plant and about $0.5 billion in SWU inventory.

3. The net cash flow is the net of all enrichment outlays and collections of revenues. Included are Government revenues in years appropriations were provided (FY 1983 onwards).

4. The adjustment for Government deliveries is needed to account for the years where no revenues (or appropriations) were provided by the Government users but the cost of providing their enrichment services were included in the net cash flow calculation. The EEI number is larger as they made an estimate of past incremental higher costs of high assay enrichment. DOE did not make such an estimate because accurate data does not exist and the amount of the incremental cost is believed to be low as many of the existing security and health and safety requirements, which are largely responsible for the higher costs, have been made a requirement only in the last few years.

5. Imputed interest for EEI is on $130 million (1600-1470). The Administration and GAO imputed interest values were calculated on the initial $1500 million and the $400 million (1600-1200) amounts. The number becomes quite large because of the number of years involved (16) and no write downs are assumed.

6. The Administration makes a $4.1 billion adjustment to reflect the fact that 40 percent of the GDP capacity will not be used in the future and that none of the GCEP investment has an enrichment use. The adjustment also recognizes that these assets have no future earning power as the competitive marketplace will not permit recovery of these costs.

Senator Ford. European competition and other things I have questions but I would be very interested in looking at your chart and the calculations and then the update is very important.

The Chairman. Mr. Chairman, I have some questions.

Senator Ford. Senator Johnston.

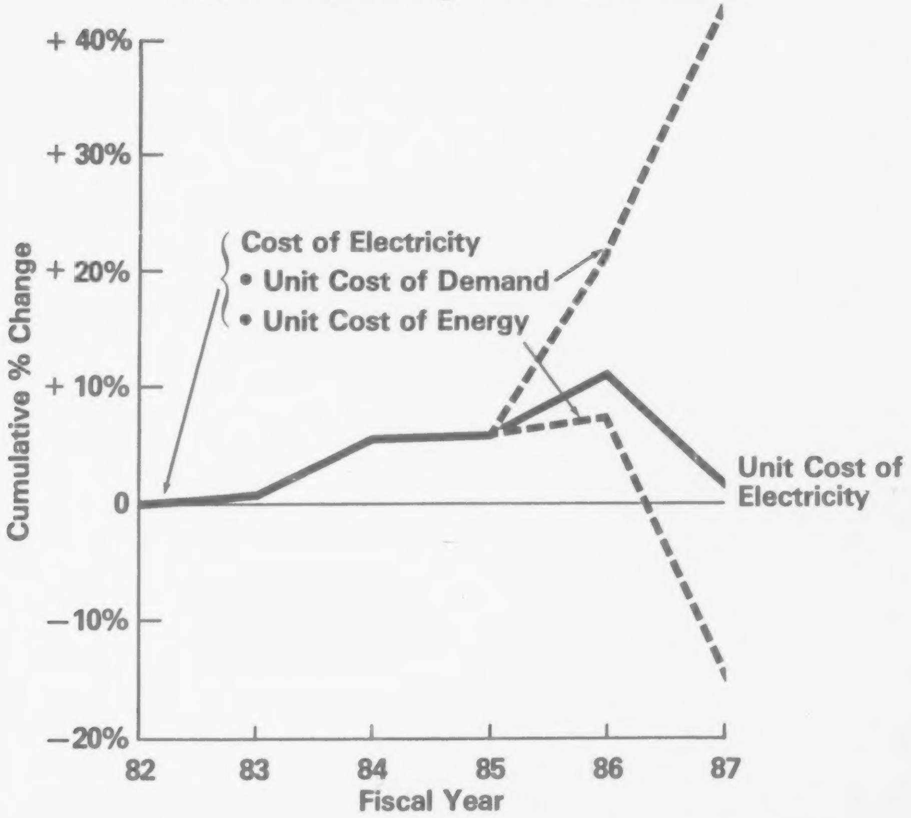
The Chairman. On the question of the demand charges to TVA, is there any ambiguity in the contract as to how you calculate those charges, or, on the other hand, do you think the contract is clear and they are trying to inflate or is your difference of opinion just based on what you think is fair?

Mr. Longenecker. Senator, the charges arise out of a contract we signed with TVA back in 1967 so we are interpreting a very old contract. We are not disputing that we signed the contract and we are not disputing that TVA or any other utility is able to recover demand charges from their customers. Rather, we do not believe that TVA has lived up to the contract

The Chairman. Is it ambiguous because it is old?

Mr. Longenecker. They are an independent ratemaking body, of course, and they set their own rates without review. To use that chart as an example, the cost of electricity when you buy it is comprised of two components. This shows the electricity cost that you pay. It is comprised of a demand charge, and that is what it takes to keep a plant ready to operate, and an energy charge, which is essentially the fuel it takes to generate electricity. The total of those two elements is the electricity costs that the TVA industrial customer pays.

Demand Charges to DOE *Increase* While TVA's Electricity Price *Decreases*



What we have plotted here is the rate of change of TVA's industrial rates since 1982. There are two key dates here. 1981 is the date in which we began terminating our power contract, and when we told TVA that we were not going to need the power then under contract. 1985 is the date when we put the Oak Ridge enrichment plant into standby. What you will notice, broken out in red is the demand charge, and shown on the black-dashed line is the cost of energy. TVA has restructured their rates over the past several years, and as you will note, has increased the demand charge by about 35 percent.

The CHAIRMAN. Is that what your contract called for?

Mr. LONGENECKER. The contract calls for a certain amount of power. TVA has a unilateral right to set rates that is not subject to review by anyone. We are liable for the demand charges for 4,485 megawatts of capacity.

The CHAIRMAN. My question is, are you saying that they are being unfair and unjust to enforce the contract according to its terms, or, on the other hand, are you saying that the contract, being old, written in 1967, does not apply to today's circumstances and therefore is ambiguous and can be interpreted two or three different ways?

Mr. LONGENECKER. We are saying that they are being inequitable in establishing their rates and in fact are charging us for costs that are not associated with keeping in standby the 4,485 megawatts of capacity.

The CHAIRMAN. Were they entitled to do that under the contract in your view?

Mr. LONGENECKER. No.

The CHAIRMAN. So in other words you think the contract is clear in your favor?

Mr. LONGENECKER. We believe our interpretation of the contract is correct and in fact in looking at the fairness of the rates as compared to other utilities in the region we do not think that they are using either fair or standard utility practice in setting the rates.

The CHAIRMAN. Does the contract call for either fair or standard practices?

Mr. LONGENECKER. It requires discussion with us prior to any major change in the rates.

Senator FORD. Let me interject myself here a little bit. TVA does not have a public service commission by which it must apply for rate increases and so therefore they set a rate and they set it unto themselves without any scrutiny by anybody else, and you cannot take them to court, as I understand it, over the rate. It puts somewhat of a different twist, I think, on what we are discussing here.

Mr. LONGENECKER. This is a contractual dispute. TVA's charges to industrial customers, their actual rates, have decreased since 1985.

The CHAIRMAN. I can see if that chart is correct it is obvious that it is not fair, but you may have entered a bad contract, and that was my question. I am trying to get the basis of the dispute. Is it that you entered a bad contract and you are trying to get out of what is an inequitable contract? Or does it call for some of these fairness balancing equities and all of that that you have to look at the standard practices with?

Mr. LONGENECKER. We are not disputing that we signed the contract or that we are committed to the 4,485 megawatts. It really is a question of whether they are charging us equitable rates.

The CHAIRMAN. Does the contract call for equitable rates?

Mr. LONGENECKER. I don't know if it specifically calls for equitable rates.

The CHAIRMAN. How does it say you charge those rates?

Dr. ROSSIN. There are two items here. One is the contract involving the power and demand charges that was written in 1967. The other is TVA's ratemaking process, and these two are independent. We testified—TVA does hold ratemaking hearings. We testified at the ratemaking hearings. They did not accept our suggestions. And we believe they could have set the ratemaking structure in a more equitable way. Had they done that we would not have the extent of this dispute.

The CHAIRMAN. My question is really a simple one. I do not know why we cannot get an answer. Did you sign a contract that gives the TVA the right to set their rates for the demand charges any way they wanted to, equitable or inequitable?

Dr. ROSSIN. The contract does not deal with how TVA sets its own rates for its entire system.

The CHAIRMAN. The contract is silent or ambiguous on that point?

Dr. ROSSIN. The contract is silent on that.

Senator FORD. I think being silent, not being a lawyer, it accepts the ratemaking process of TVA.

Senator EVANS. I wonder if I might. Did TVA change their ratemaking structure as it relates to demand versus energy costs for all people on the system?

Mr. LONGENECKER. Yes, sir, they did.

Senator EVANS. Okay. Is there anybody that you know of of any consequence on the system that has an idle plant? In other words, they are paying demand charges and receiving no electricity for it?

Mr. LONGENECKER. Not surprisingly, no.

Senator EVANS. Let us be very blunt about it. TVA saw a good deal and went for it. If they have got 4,000 megawatts of demand and they do not have to supply any energy, then it is easy to go in and just jack the heck out of the demand prices and lower energy rates, and everybody else gets a big benefit out of it.

Mr. LONGENECKER. We think it is surprising, with their nuclear plants down and their other problems, that their industrial rates could have gone down, but you can see how they——

Senator EVANS. Your view is the unit cost of electricity has gone down because coal prices are down, or is it going down because you are paying a fat lump to them for which they provide no benefit?

Mr. LONGENECKER. We think there is a pretty direct relationship between the half billion dollars we are sending them this year and the low or industrial rates.

The CHAIRMAN. I think I am beginning to get the picture to this thing. It is what you call Uncle Sugar.

Thank you, Mr. Chairman.

Senator FORD. Well, some people are just smarter earlier than others. [Laughter.]

Dr. Rossin and Mr. Longenecker, we do appreciate it, and we will be submitting some questions. I think Senator Evans indicated that he would, and I will, too. And as usual, we will entertain a timely acknowledgment of those questions.

Thank you both for your patience. We will submit both of your names for the Job award.

We have Mr. Robert Steffy, Manager of Power for the Tennessee Valley Authority from Chattanooga; and Mr. Edward Christenbury, General Counsel, TVA from Knoxville. Gentlemen, we will accept your statement for the record if you want to summarize it, whatever you want to do.

Mr. Steffy, you may go first. I always like to lean to the right.

STATEMENT OF ROBERT C. STEFFY, JR., MANAGER, OFFICE OF POWER, TENNESSEE VALLEY AUTHORITY

Mr. STEFFY. Thank you, sir.

We each do have a statement that we will be submitting for the record.

Senator FORD. They will go in the record.

Mr. STEFFY. I would like to summarize the statement.

Senator FORD. You may proceed.

Mr. STEFFY. I appreciate the opportunity to appear before this Committee on this very important matter. As you mentioned, Mr. Christenbury, TVA's General Counsel, is here and he will be glad to answer questions.

TVA and DOE's predecessor, the Atomic Energy Commission, entered a power supply contract over 20 years ago, which as amended has required TVA to make available upon demand 4,485 megawatts of electric power from its system for use at the Paducah and the Oak Ridge, Tennessee facilities.

To put that in perspective, the size of that load is the equivalent of the peak electric load used in Washington, D.C. So it is quite a substantial load and a very large contract, and certainly as large as any I am aware of anywhere in the nation.

In order to make this power available from its system, TVA had to make huge investments in power generating, transmitting, and other facilities. As an indication of this, TVA assets in power facilities have increased from $2.3 billion in 1967—and that was the year that TVA and DOE entered into the current contract—to $22.8 billion in 1986.

Of course, TVA is not attributing all of this increase to DOE. However, it does indicate the magnitude of the investment made over that time to increase and improve our bulk power supply system to serve all TVA's customers.

To be assured of recovering these costs, our contracts with industrial customers include a demand charge, which is a charge associated with fixed ongoing costs, and an energy charge, which is, as mentioned earlier, a charge associated with our variable costs, primarily our fuel cost. While the energy charge is only paid as energy is used, the minimum payment obligations relating to the demand charge are paid regardless of use.

The DOE contracts, because of their very large size, represented a very substantial risk to TVA. As is the case with other industrial customers, the contracts with DOE appropriately include minimum payment obligations which are based on the prevailing rate demand charge continuing for the term of the contracts.

This helps to recover a portion of the investments made by TVA to make this power available to DOE. This was clearly understood by the parties when entering into the contracts and until recently had not been objected to for the 20 years they have been in place.

Another key element of the power supply arrangement is the fact that DOE is to be supplied from the entire power system at the prevailing rates. At the time of contract discussions, the AEC had the option of having a dedicated power supply, but elected to have its power needs served from TVA's total system.

This arrangement benefited DOE over the years since it did not have to bear the risk of the investments in power facilities, nor did it have to make arrangements for backup power to meet its power needs during periods when a dedicated plant or plants would be shut down for repairs and maintenance.

Basing DOE payments on prevailing rates meant that it enjoyed the benefit of the lower embedded cost of capacity built during periods when construction costs were substantially lower. Under prevailing rate supply arrangements, the benefits and costs of the power system are equitably shared by all those served by the TVA system, including the Department of Energy.

Some questions have been raised related to the cost of our canceled nuclear plants. TVA has canceled eight nuclear units that were under construction. The cost to TVA of canceling these units totals $4.56 billion. These costs are being written off over an eleven year amortization period beginning in 1984 and are approximately half written off at this time.

Since 1984, under the handling of the writeoffs associated with these assets, the writeoff amounts have not caused increases in the charges applicable to our customers, including DOE. However, from a cash flow standpoint the interest on the debt associated with the canceled units must continue to be paid and recovered through the revenue from all customers, including DOE.

TVA is required by law to collect revenues each year sufficiently high to cover, among other costs, all interest charges on all of its debt.

As discussed earlier, it is important to note that specific generating units were not assigned to, nor attributable to, DOE. DOE became by desire and by contract part of the total TVA system supply arrangement, receiving the benefits and being responsible for the obligations under such an arrangement.

Under this power supply arrangement, DOE is required to pay its fair share of all costs, just as any other ratepayer, and it is not entitled to any special treatment that would unfairly shift these costs to other ratepayers simply because the 20 year old contract arrangements do not now suit DOE.

It would be inappropriate from an equity basis, as well as contrary to the legal obligations under the contracts, for TVA to permit DOE to improperly shift its cost burden to other ratepayers.

And that does not mean that we are not willing or trying to work with DOE to help them and at the same time protect our other ratepayers. We have had and we are having continuing discussions with them at this time, and we expect to continue, of course, to have further discussions with them.

Let me ask Mr. Christenbury now, if I could, if he has a statement he would like to make.

[The prepared statement of Mr. Steffy follows:]

STATEMENT OF
ROBERT C. STEFFY, JR., MANAGER OF OFFICE OF POWER,
TENNESSEE VALLEY AUTHORITY
BEFORE THE
SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT OF THE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
March 13, 1987

We are glad to have this opportunity to provide information about the long-term contractual arrangements, including those with the Department of Energy, under which TVA makes available electric power to customers having large loads. The operational and economic bases for these arrangements are closely related to the legal bases for them. Edward S. Christenbury, TVA's General Counsel, is here with me and will be glad to discuss the legal aspects of these arrangements.

TVA, consistent with its statutory responsibilities, supplies power at wholesale to 160 municipal and cooperative distributors in Tennessee and parts of six other states for resale to domestic, commercial, and industrial customers. In addition, TVA provides power directly for a number of large industries having very large or unusual loads, as well as several Federal agencies, including the DOE facilities at Oak Ridge and Paducah.

TVA makes electric power available for use at the DOE facilities under contractual arrangements which date back to 1943 at Oak Ridge and 1951 at Paducah. Under the terms of the existing contracts, availability of power supply (taking into account certain reductions made by DOE under the contracts as described below) continues until March 7, 1994. The specific amounts of power, which TVA is responsible for having available and DOE is obligated to pay for at the applicable rates, are set out in those contracts. The total amount, which was 1,740 MW in April 1971, has increased through a number of steps to 4,485 MW. Pursuant to action taken by DOE under the contract, this amount will reduce, by successive steps of 1,000 MW each, in the months of December in 1989, 1990, 1991, and 1992, and by a final step of 485 MW (to zero MW) in March 1994. As provided under the contracts, DOE each month pays a capacity (demand) charge based upon the amount of power contracted to be made available and an energy charge for the amount of energy actually consumed during the month.

As a supplier of power, TVA's objective is providing the Tennessee Valley region with an ample supply of electric power at the lowest feasible cost. TVA considers its electric power system to be for the benefit of the entire area it supplies. Under these power supply arrangements, wherein charges to customers are based on prevailing rates, individual customers are not served from individual generating plants. Instead, all of TVA's power goes into what is in effect a common pool, and all of TVA's customers are supplied from that pool.

Most commodities can be stored until sold, and the plants producing them can continue production up to their maximum capacity without interruption. However, this condition does not exist in the case of electricity. Electricity is unique in that it cannot be stored for later use and it must be produced as used. Also, any customer can use electricity whenever it wishes by actions as simple as flipping a switch. The power supplier must be able to meet the demand of its customers instantaneously. Accordingly, power suppliers, including TVA, plan and construct generating, transmission (including system interties) and other facilities to have available at all times the capacity required to meet the forecasted demands of all their customers. This capacity includes the necessary margin to take care of equipment outages and special circumstances which may arise.

It now requires many years to construct and place in commercial operation large steam generating units. TVA thus must plan years ahead to match system capacity with loads and must continuously have under construction the capacity to meet projected growth in both existing and new loads. These generating and other facilities require tremendous investments of money; the investment per revenue dollar is much larger in the electric industry than in most others. Most of this investment is, of course, made long before the generating plant and related facilities are available for use, and the fixed costs on them continue and must be paid throughout their life (approximately 35 years) whether or not those who contract for electricity ever use the amounts for which they contracted.

In serving customers with large loads directly, TVA enters into "availability contracts." Under an availability contract, TVA agrees to make available continuously for the term of the contract the specified voltage and frequency at a specified delivery point, such as a substation. The maintenance of such voltage and frequency constitutes availability of the power and energy for which the customer agrees to pay. The amount of power which the customer requests, and TVA is responsible for providing under the contract, is generally expressed in kilowatts and is the customer's "contract demand" under the contract. While the customer can use this available power to whatever extent it wishes, TVA must at all times, except for force majeure, make available firm power in the amount specified in the contract.

Consistent with the provisions of the TVA Act, TVA establishes the rates for the electric power it supplies for the region. The setting of these rates requires decisions involving statutory requirements, bond covenant requirements, costs, and various other factors. Among these is the requirement of the TVA Act that power rates be as low as feasible consistent with the power system being self-sustaining and -liquidating.

As is generally true throughout the electric power industry, rates which have been established for serving large loads in the TVA region include (1) a component related to TVA's fixed costs (such as interest and depreciation) on the equipment and facilities required to make power available (this is generally referred to as a demand or capacity charge), (2) a component generally related to those costs (such as fuel) which vary with the amount of energy generated (this is usually referred to as the energy charge), and (3) certain minimum payment, or minimum bill, obligations extending for the term of the contracts.

The minimum payment obligation is a customary and important part of the rate structure because a large part of the cost of serving a customer is independent of how much power the customer uses and depends instead on how much power the customer has asked the supplier to have available for the customer. TVA has long sought, in designing its rates, to reflect costs of service. The minimum payment obligations under TVA's industrial rates are an integral part of that effort, taking into account as they do the capacity needed to serve large industrial loads and the fixed costs--interest, depreciation, operation, maintenance, and administration--associated therewith. The minimum payment obligations applicable for customers under the rates reflect the risks associated with serving loads of various sizes and the usage patterns associated with different levels of contract demand.

If a large customer were to discontinue taking power or cut its actual use far below the amount TVA is required to make available under the contract, TVA, unless protected by minimum payment obligations, would suffer a substantial loss since the capacity provided to make the power available would not be used for the purpose intended. This loss would result in higher rates that would affect other customers because TVA is a nonprofit entity whose customers' rates are directly related to the cost of serving them.

TVA in initially entering into a contract with a customer having a large load (100 MW and larger) will only do so on the basis of a contract extending at least 10 years. This assures that TVA, through the minimum payment obligations for the term of the contract, will be able to recover at least a portion of the fixed costs incurred in providing facilities necessary to provide the amount of power requested by the customer. TVA's fixed costs, of course, continue for the life of its equipment and facilities (about 35 years), which is much longer than the term of its power contracts. TVA thus bears the risk of having to carry those fixed costs if other system loads do not increase sufficiently to pick up loads of customers which do not renew their contracts or which do renew them for substantially reduced amounts of power.

This was recognized by the parties when DOE approached TVA before the current contracts were signed in 1967 and requested TVA to make available very large amounts of power for the Oak Ridge and Paducah enrichment plants, beginning in 1971. DOE, at that time, did not choose to undertake the risk associated with providing its own generating facilities. Nor did it wish to enter into arrangements whereby TVA would build and dedicate specific generating plants for serving the DOE loads. Instead DOE asked, and TVA agreed, to enter into the contractual arrangements whereby DOE's enrichment plants would be served from the overall TVA system, as are all other customers served by TVA.

Accordingly, the contractual arrangements agreed to by the parties provided for rates and charges based on TVA's prevailing general power rates as modified or replaced from time to time. Moreover, after extended discussions, including recognition of the very large fixed-cost risks being incurred by TVA (which would extend even beyond the contract term), it was agreed in entering into the contracts that the capacity charge would be 45 cents higher than the standard demand charge, but that, in turn, the energy charge would be lower than the standard energy charge. As provided under the contracts, these rates and charges through the years have been revised as necessary to reflect modifications and replacements of the prevailing rate schedule. (However, the 45-cent component has remained constant.)

DOE not only initially contracted under the terms that have been described--it subsequently approached TVA on a number of later occasions between 1968 and 1974 insisting on contract amendments obligating TVA to make available vast additional amounts of power at specified future times at levels which reached 4,485 MW in July 1984. It was not until fiscal year 1981, long after TVA was committed to constructing the capacity necessary to make this power available, that DOE chose to utilize substantially less power than it had contracted for.

The conditions now existing as a result of the continuing operational cutbacks at DOE's facilities are a very real life demonstration of the absolute necessity for the obligations we have discussed continuing for the contract term. TVA has expended exceedingly large sums to provide system facilities adequate to supply the 4,485 MW of power requested by DOE, and set out in the Oak Ridge and Paducah contracts.

Of course, TVA did not build any specific plant to serve the DOE load--DOE is served from the total TVA system. Nevertheless, it may help put this matter in proper perspective to note that, in order to make this amount of power available (including necessary capacity reserves), it requires the equivalent of 5 large nuclear units. Projected costs for such units range from $1 to $3 billion for each unit or a total of $5 to $15 billion. Obviously, the fixed costs TVA has incurred in providing facilities to make available the amounts of power requested for DOE's facilities will continue even though DOE may use less power as a result of operational cutbacks. Without the minimum payments by DOE, these fixed costs incurred in providing capacity to serve DOE's facilities would have to be recovered from other consumers through higher rates.

If TVA were to relieve DOE of its contract obligations, as has been suggested, and these lost revenues were recovered from the large industrial customers in the TVA region, it would necessitate an increase in charges of over 90 percent. (If the lost revenues were recovered from all consumers--residential, commercial, and industrial--it would necessitate an increase of almost 12 percent for all these consumers.)

Moreover, if DOE were to be relieved of its payment obligations, other customers with large loads under similar situations would expect and demand that they too be relieved of minimum payment obligations. If this were to occur, it could only result in further improper shifting of costs to other consumers through higher rates.

TVA's risk of not being able to fully recover the fixed costs of providing facilities increases significantly for large customer loads. And the larger the load, the greater is that risk, because there is less likelihood of a market being available to absorb such amounts of power when a customer with a large load does not renew its power contract. Again, this is particularly significant with respect to DOE, which has a total contract demand of almost 4-1/2 million kilowatts, or more than 17 times the second largest contract demand, which is for an Aluminum Company of America (ALCOA) facility. The DOE contract demand is more than 24 times the contract demand of any TVA industrial customer other than ALCOA.

The risk of being unable to recover through additional sales of power fixed facility costs continuing after the expiration of a contract that is not renewed, has been magnified further by the fact that growth in electric power loads are now projected to increase by somewhere between one-half of one percent and 3 percent per year. This is quite a contrast to the annual 6-8 percent load growths that were being projected at the time TVA entered into the contracts to supply power for the Paducah and Oak Ridge operations. In light of such circumstances, the economic necessity for the contractual arrangements that provide some protection to TVA's other customers for investments made in providing system facilities on the basis of the firm contract commitments with DOE is quite apparent.

Over the years, the parties carried out their respective obligations as set out in the contracts. However, DOE has recently been pursuing ways to avoid payment obligations under the contracts by means that would place upon others the cost responsibility that is properly DOE's. In this regard, DOE has suggested that the rates and charges applicable to it should be less than those reflecting TVA's prevailing general power rate. This, of course, would be contrary to the specific arrangements agreed to by the parties contracting. DOE, in entering into the contractual arrangements for TVA to provide power, chose to be served from the overall system with charges being based on the prevailing charges applicable for industrial service. In this way DOE, through the years, has continued to benefit by having a capacity charge which has reflected the average embedded cost of the overall system.

Over the years, system costs have increased, particularly in connection with the plants (some of which are now canceled or deferred) being constructed to supply all customers, including DOE. All customers, including DOE, have shared in the necessary rate increases. There is no basis for a special lower rate for DOE. Clearly, to provide special relief for DOE would be unfair to the other ratepayers who would have to pay increased rates to cover fixed costs incurred by TVA in undertaking to provide facilities for system service.

DOE is also now objecting to paying the 45-cent differential on the capacity charge described previously. This component of the demand charge, and its corresponding reduction in the standard energy charge, has been a part of the power contracts since 1967. When developing the contracts, the parties discussed a number of ways to help assure that TVA would recover at least a portion of its fixed costs, costs which would continue even beyond the end of the contract term. The arrangements set out in the contracts were the product of the overall effort of the two parties to best meet their respective needs. The contracts with DOE will expire long before TVA will have recovered its fixed costs (this is compounded by DOE having exercised early contract termination rights), clearly demonstrating the need for and equity of this provision.

DOE also has made certain suggestions as to how it thought electric charges might be lowered now with corresponding increases being made in future rates. The expressed intent of these suggestions, which generally involve postponement of the recovery of costs, was to shift to other ratepayers certain system revenue responsibilities being covered currently by DOE under its power contracts. To the extent financially prudent and legally permissible, TVA already postpones recovery of costs through its rates consistent with the application of Generally Accepted Accounting Principles.

One of the suggestions was to capitalize costs relating to idle nuclear plants, but the costs associated with the two temporarily idle plants are already being capitalized to the extent appropriate under Generally Accepted Accounting Principles.

Another suggestion was that rates could be lowered by capitalizing interest costs. However, all interest associated with construction work in progress is presently being capitalized. This, of course, does not relieve TVA of the requirement under one of its bond tests, to collect revenues each year sufficiently high to cover, among other costs, all interest charges on all of its debt. Thus, borrowing funds to pay interest as suggested by DOE would, in addition to being financially imprudent, violate that requirement.

A final suggestion by DOE was that there might be a reduction in margin requirements. TVA's determination, as provided for under the rate tests, of the desirable margin for investment in power system assets involves various important financial considerations. Among these is the maintenance of a financially sound operation. TVA has established its margin objective at a minimum level consistent with this responsibility. In this regard, the financial community has informed us that, if TVA is to remain in a position of being assured that it can obtain necessary funds and of being able to obtain them at the most favorable rates, it must have a proper level of operating income. It is in the interest of the ratepayers that TVA continue to pursue these objectives.

While none of the above suggestions that have been made by DOE provides an appropriate basis for TVA to relieve DOE of power contract obligations, we are continuing to work with DOE representatives in seeking other possibilities. In this connection, TVA has worked closely with DOE in trying to help identify means whereby DOE could use different types of electric energy or otherwise reduce its costs in ways that would not improperly cause other ratepayers to have the responsibility for DOE's cost obligations. Presently, TVA and DOE representatives are again involved in ongoing discussions about the arrangements and are looking for opportunities, consistent with the contractual obligations, that would achieve savings for DOE. Any arrangements between the parties must, of course, be such that would not shift costs unfairly to other TVA ratepayers.

I appreciate this opportunity to describe the arrangements under which TVA makes power available, particularly as they relate to the DOE obligations. Mr. Christenbury will now be happy to comment on the legal aspects of such agreements.

Senator FORD. Mr. Christenbury.

STATEMENT OF EDWARD S. CHRISTENBURY, GENERAL COUNSEL, TENNESSEE VALLEY AUTHORITY

Mr. CHRISTENBURY. Senator, let me just briefly comment on two aspects of the legal question. One of them goes to Senator Johnston's question.

First of all, what I do not think is disputed is the minimum payment type of contract that we have here is one that is legally binding, as has been recognized by the courts over the years. In fact, some of the cases upholding these type contracts involve TVA litigation.

The other aspect of it is the contract provides that DOE—originally it was the AEC, but then DOE—will pay the prevailing rate. If you will bear with me just a second, I can read you the paragraph, because I think it is the operative provision of the contract. It says:

> It is recognized that the above rates for power and energy and the adjustments thereto are based on TVA's prevailing general power rates, which may be modified or replaced by TVA from time to time. TVA shall have the right, after discussion with AEC, to revise the rates, charges, and adjustments provided for herein to reflect modifications or replacements of said prevailing rate schedule from time to time.

So I recognize that this is a larger question, and the Senator is viewing many aspects of it. But from the legal standpoint we would view it as a binding legal contract and actions that TVA has taken are in accordance with the express provisions.

The other point I would mention, which may well be familiar to the Committee, but it may also be helpful in way of background, is that this matter first came before the Congress back in 1953 when they were considering an amendment to the Atomic Energy Act to permit the old AEC to enter into a contract with TVA to supply this power.

At that time there was a presentation to the Congress and the AEC advised the Congress at that time that it may well be that under this contract there would be one or more years where they would not take any power, but that they recognized their full responsibility to nonetheless pay for the demanded energy that they were contracting for.

And also, under that provision, 164 of the Atomic Energy Act, each of these contracts, the 1967 contract which we are talking about and each of the supplements, were submitted to the old Joint Committee on Atomic Energy for their consideration.

Thank you.

[The prepared statement of Mr. Christenbury follows:]

STATEMENT OF
EDWARD S. CHRISTENBURY, GENERAL COUNSEL,
TENNESSEE VALLEY AUTHORITY
BEFORE THE
SUBCOMMITTEE ON ENERGY RESEARCH AND DEVELOPMENT OF THE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
MARCH 13, 1987

The need for minimum payment obligations under power supply arrangements as discussed by Mr. Steffy has been expressly recognized by the courts as such provisions have consistently been held to be enforceable in accordance with the contractual terms. These court opinions have involved TVA contractual arrangements as well as those of other power suppliers.

This was examined by the court as it made a detailed analysis of prior precedents and authorities in ruling in favor of TVA in Mobil Oil Corp. v. Tennessee Valley Authority, 387 F. Supp. 498 (N.D. Ala. 1974). The plaintiff in that case, a directly served customer of TVA, questioned the legality of TVA's contract provisions calling for fixed contract demands and minimum payment obligations for the full 10-year contract term. Mobil had shut down its plant with about three years left on its contract term, thus becoming obligated for certain minimum payments each month. The court, in its decision recognized the practical necessity for, and the common use of, such provisions. The court's remarks are so comprehensive and well stated that I would like to repeat part of its comments in discussing the purpose of minimum bills being applicable for specified periods.

> The demand upon a supplier of electric power fluctuates significantly from hour to hour, day to day, and season to season. Electricity is unique in that it cannot be stored to meet the demand for it, but must be available for use instantaneously at the flick of a switch or the push of a button. Accordingly, TVA, like other power suppliers, must provide generating and transmission capacity to meet the total forecasted maximum demands of its customers (including margins in case of outages). This requires very large capital outlays.

The "lead time" required for the construction of new generating facilities had been increasing in recent years, and now ranges from 6 to 10 years. The heavy investment in such facilities must accordingly be committed long before the facilities are available for use; and the fixed costs associated with such investment (depreciation, interest, maintenance, etc.) continue and must be met whether or not the facilities actually generate electric energy.

Because of this situation, rates chargeable by electric power suppliers to customers with large contract demands, such as Mobil's, commonly provide for minimum bill payments over specified terms of years regardless of the extent to which they actually use the power which the supplier has contracted to make available for them. As stated by the

Court of Appeals for the Sixth Circuit in City of Memphis, Tenn. v. Ford Motor Co., 304 F.2d 845 (6th Cir. 1962), when lead times were considerably shorter than they are today:

> [T]he district court found that the custom and practice of electric facilities in the Tennessee Valley area, and throughout the country, is to require large industrial customers, such as Ford, to execute contracts providing for minimum bill requirements, and for terms of five years or more. . . .
>
> It appears that, in the electric power industry, plans must be made for the determination of power needs from three to five years in advance in order to take care of future loads because of the extended period required for the

> planning and construction of large generating units, and this extended period is referred to in the industry as "lead time." It is normally impossible to adjust construction programs to take account of the loss of major loads occurring within such lead time; and this is the economic basis for the industry's requirement of contracts for fixed periods with minimum payment obligations during the entire term of the contract [at 503-04].

In explaining that the minimum payment obligations are an integral part of TVA's rates applicable over the entire term of the contract, the court said:

> A minimum bill is in fact a rate for electric service. Avant Gas Serv. Co. v. Corporation Comm'n, 184 Okl. 583, 89 P.2d 291, 292 (1939); Great Northern R. Co. v. Armour & Co., 26 F.Supp. 964, 967 (N.D. Ill.1939). See State v. Sloan, 139 La. 881, 72

So. 428 (1916); Donnell v. Brockman, 117 Ark. 132, 173 S.W. 843 (1915). Minimum bill provisions are an integral portion of TVA's rates and have been from the inception of TVA's power program. . . .

* * *

The contract is an agreement under which Mobil simply promises to pay the applicable rates, including minimum bills, for the full contract term. The attempted separation of the minimum bill as a rate from the contract to pay it seems to the Court fallacious. The purpose of the minimum bill is to assure the power supplier of revenue to help meet its fixed costs on capacity made available to supply the customer's contract demand during the term of the contract. A minimum bill which the customer was not obligated to pay throughout the contract term, but only until he might decide to terminate or reduce his actual power use, obviously would not serve this purpose.

* * *

For the Court to convert the ten-year term of Mobil's contract to pay the minimum bill portion of the rates into a term of six years and ten months, as Mobil requests, would represent judicial review and modification of TVA's rates just as clearly as would a judicial change in the level of the rates. It would also be incompatible with section 10 of the TVA Act, which expressly authorizes TVA to enter into power contracts "for a term not exceeding twenty years." Mobil's contention would also require the Court itself to fix new rates applicable to Mobil's actual use of power during the remaining

> three years and two months of the contract term (Complaint, prayer 3), even though TVA has already fixed the applicable rate in the amount of the minimum bill [at 508, 509].

The court further pointed out that even if the contract were viewed separately from TVA's authority to set rates the result would be the same. It noted in this connection that under an availability contract such as that involved between TVA and its directly served customers, the supplier simply agrees to make power available and the customer agrees to pay for such availability in accordance with the contract price terms whether the customer actually uses the power or not.

The Mobil court noted that minimum bill provisions in power availability contracts have been uniformly upheld and enforced on this basis, and in this connection cited Gatineau Power Co. v. Fraser Companies, Ltd. [1941] 2 D.L.R. 487 (Can. 1940); Oliver-Mercer Elec. Coop., Inc. v. Fisher, 146 N.W.2d 346 (N.D. 1966); San Joaquin Light & Power Corp. v. Costaloupes, 274 P. 84 (Cal. 1929); Marin Water & Power Co. v. Town of Sausalito, 143 P. 767 (Cal. 1914); Beck v. Indianapolis Light & Power Co., 76

N.E. 312 (Ind. Ct. App. 1905); Gould v. Edison Elec. Illuminating Co., 60 N.Y.S. 559 (Sup. Ct. 1899); and 22 Am. Jur. 2d Damages §§ 212-213, at 297-99 (1965).

The Mobil court also referred to the well-known rule, citing United States v. San Francisco, 310 U.S. 16, 29-31 (1940), and Lyle Cushion Co. v. McKendrick, 204 F.2d 609, 612 (5th Cir. 1953), that a party who has accepted the benefits of a contract over a portion of the contract term cannot escape its burdens.

Carborundum Company, seeking to avoid the same type of minimum payment obligations for the term of its TVA power contract as had Mobil, filed suit in 1980. In its opinion in favor of TVA, the district court expressed its view that the issues in the case had been carefully and thoroughly reviewed and correctly decided in the Mobil case. The court further explained that the minimum payment obligation "is simply an integral portion of the rates which TVA has fixed, pursuant to express congressional authority, for electric service to industries, enforceable and collectible during the term of the contract." Carborundum Co. v. Tennessee Valley Authority, 521 F. Supp. 590, 594 (1981). On October 22, 1982, the

Jnited States Court of Appeals for the Sixth Circuit affirmed the judgment of the district court in all respects for the reasons that had been set forth by the Chief Judge of the district court.

The protection, which the courts have recognized as being needed by a power supplier when a customer discontinues or reduces its power takings, is discussed in Caywood, Electric Utility Rate Economics ch. 3, "The Tariff" (6th printing 1972):

> [Rate] Schedules for larger loads in particular carry term provisions which require that the customer sign a contract for a specified period during which he is committed to certain minimum payments. Such provision is, of course, protection for the utility against idle facilities [at 65].

In an earlier discussion of utility pricing (ch. 2, "The Price Structure"), Caywood lists a number of items influencing rate design, two of which he states as follows:

> 17. The larger the load and the lower the price, the more ratchet and term protection the utility needs

> against loss of load and resulting idle facilities.

* * *

> 20. It is impossible to make prices high enough for short terms for the large load unless the load can be readily replaced [at 33].

As explained by Mr. Steffy, even with minimum payment obligations for the term of the contract, TVA takes the risk that fixed charges may not be recoverable after the end of the contract term if the customer elects not to renew the contract and its load cannot be immediately replaced. The minimum payment portion of TVA's rates may thus work to TVA's advantage in some circumstances and to its disadvantage in others. The basic fairness of this approach was specifically considered and approved by Congress in 1953, when it amended the Atomic Energy Act (67 Stat. 182) to authorize AEC to enter into very large contracts (with TVA and two private utility groups) which provided for cancellation charges equivalent to minimum bills following any cessation or reduction by AEC of actual power use. The amendment was approved after it was made clear during congressional committee hearings that such payments by AEC to TVA might continue for four years and three months after cessation of power use, and entail payment of a large sum to TVA during such period.

The hearings included the following colloquy between Representative Yates and Mr. Cook of AEC:

> Mr. YATES. Let us go back to TVA for a moment. Suppose TVA can shift power over to other Government installations or non-Government users, will there be a diminution in your cancellation cost?
>
> * * *
>
> Mr. COOK. The cancellation charge with TVA is based upon their normal load growth, an estimate of how long it would take them to absorb any power that we canceled into their normal load growth of their system. It provides for a continuation of the demand charge during that period, so that they, in turn, can make a return to the Government as they are required by law to amortize their facilities.

> Mr. YATES. Then what you are saying is this. In the event that TVA can shift their power, you will still have to pay the charges to them. It is based upon their estimate--that is, their charges are presently based upon an estimate as to what their loss will be, but *in the event that their loss is not so great, in the event that they are able to shift it over to other users, would you nevertheless have to pay those costs to TVA*?
>
> Mr. COOK. *That is right*. But in the event that it takes them longer than the estimate, based upon their normal load growth, we would not pay more [*Hearings on the Second Independent Offices Appropriations for 1954 Before a Subcomm. of the House Comm. on Appropriations*, 83d Cong., 1st Sess., pt. 1, at 361 (1953)].

In this regard, the necessity for providing protection for the electric power suppliers building capacity to serve AEC facilities was pointed out by the Joint Committee on Atomic Energy, in S. Rep. No. 477, 83d Cong., 1st Sess. (1953), which accompanied the proposed legislation referred to above. The report, in explaining why such contractual arrangements were necessary, pointed out that if the power was not used by the AEC:

> [T]he utilities would have to find other users for the power in the area. Since the gaseous diffusion plants, when in full operation, will consume as much energy in a year as New York City would consume in 3 years, or three-fourths as much energy as the iron and steel industry is estimated to need in 1955, or 70 percent of the requirements of the chemical industries, or about one-quarter of the energy used in homes and farms of the entire Nation, the suppliers may have considerable difficulty in finding substitute users for this energy in the event the Commission should cancel the contracts.

> The estimated normal growth of power use in the three geographic areas is about 6 percent per year, and these suppliers probably could not immediately absorb the extra capacity. Therefore, some adequate cancellation payment provision is needed in the event that the Government should cease to purchase the power from these facilities [at 2].

Conditions of the very kind that were considered when AEC was given authorization to enter into such contractual arrangements have now occurred, although with more severe consequences for TVA (and thus the ratepayers of the region) than contemplated at the time the existing contracts were entered into for supplying power for DOE facilities at Oak Ridge and Paducah.

Tremendous sums of money have been spent by TVA to provide the capacity necessary to supply the very large amounts of power requested and contracted for these facilities. As a result of various factors, such as the rapidly escalating costs resulting from the inflation that affected the Nation's economy for several years, the cost of providing such capacity has been much higher than originally projected. However, DOE's substantial operational cutbacks are resulting in significant continuing reductions in the amount of power being used at the facilities. This comes at a time when power loads other than those of DOE are only projected to increase by somewhere between one-half of one percent and 3 percent a year as opposed to past growth of 6 to 8 percent annually. As a result of these conditions, the capacity charges, or minimum payment obligations, of DOE under the existing contracts are not even sufficient to cover the funds that have been expended by TVA to provide generating facilities to meet present contract demands, much less adequate to help offset those continuing fixed facility costs that must be borne by TVA ratepayers after the expiration of the existing contracts. Present projections are that any renewal contracts with DOE will be for significantly lower contract demands.

As mentioned by Mr. Steffy, DOE, in an effort to shift some of its payment obligations to other ratepayers, suggested that TVA, in establishing rates, should not include in current revenue requirements the interest on funds being used during construction. In addition to not being financially prudent, this is not possible. Under the financial tests and requirements set out in the TVA Act and TVA's Basic Bond Resolution adopted pursuant to the Act, TVA is precluded from following such a course of action.

TVA is required to charge rates sufficient to cover all necessary expenditures in operating the power system, including "debt service on outstanding bonds." This is specifically described as comprising, among other things, the sum of all amounts required to be paid during each fiscal year as interest on all its bonds, notes, and other evidences of indebtedness. Accordingly, TVA rates must cover all interest no matter what the accounting treatment.

In conclusion, we appreciate the opportunity to explain how TVA, through long-term contractual arrangements and minimum payment obligations, attempts under its agreements with directly served customers to recover at least a portion of those fixed costs that are incurred in providing facilities to supply the amounts of power requested by those customers. Otherwise, as pointed out by Mr. Steffy, such costs would have to be shifted unfairly to other customers through higher rates. This would substantially impact the ratepayers of the region in the case of DOE, because of its large power requirements. We would be happy to provide any further information or data that would aid this subcommittee in examining these matters.

Senator **Ford**. Thank you very much, Mr. Christenbury.

I have two or three questions and kind of a follow-along. But let me—if you can answer these questions, I would appreciate the answer today. And if you cannot, then I would like for you to submit the answers in writing.

How much is DOE paying TVA for power not taken in 1987, and what will the demand charges be in 1988?

Mr. **Steffy**. Senator, it is approximately $510 million in 1987. That is their minimum payment obligation, if you will, and their payment of the demand charge. And they are taking some, using some energy, at the Oak Ridge facilities. But this is the amount that they are paying in demand charges, and are not taking any energy associated with it.

Senator **Ford**. What happened to the—did you have a take and pay, so-called take and pay contract, at Oak Ridge?

Mr. **Steffy**. There were two contracts, one at Paducah and one at Oak Ridge. Each contract has very similar terms. It is just for different magnitudes.

Senator **Ford** What happened to your contract with Oak Ridge?

Mr. **Steffy**. It is in exactly the same situation as the one at Paducah. They are paying the minimum bill on it and the one at Paducah, and it is the combined bill that I was referring to, the $510 million.

Senator Ford. 1988 is $550 million?

Mr. **Steffy**. No, sir. The bill in 1988 cannot be determined at this point because we have not established rates for 1988. Their 1988 bill will be determined based on the contract demand and they will pay their demand associated with the prevailing rates, as in the text that Mr. Christenbury read to you.

Senator **Ford**. They will not be any lower than $510 million?

Mr. **Steffy**. You are asking me do we expect a rate decrease in 1988? No, sir.

Senator **Ford**. Well then, that means it will not be any less than $510 million, right?

Mr. **Steffy**. That is correct.

Senator **Ford**. And you expect it to be higher?

Mr. **Steffy**. It is too early for me to project what the rates would be, but I would be very surprised if they did not go up some, yes, sir.

Senator **Ford**. Okay. So DOE has made an estimate. You will not be surprised but what they go up some.

At approximately half a billion dollars a year, DOE contends that the cost paid to TVA for power not taken is excessive. Do you feel—how much do you feel is excessive?

Mr. **Steffy**. Senator, we do not feel that what they pay is excessive. We feel that the contract is clear and we feel that it is equitable. We made huge investments in assets over that time period, and we think that it is fair that they pay their share the same as the rest of our customers.

Senator **Ford**. Well, will TVA's electricity rates increase if DOE's costs per power not taken are reduced or, as DOE believes, with some accounting changes using generally accepted utility practices and accounting rules could the TVA rates remain at a stable level?

Mr. STEFFY. Senator, we have talked with the Department of Energy staff about the recommendations that I think you are talking about and we have found nothing in those recommendations yet, no suggestions that would equitably allow us to continue with our present rates and to let them off the hook, if you will.

The suggestions in fact are contrary in many cases to what we think are our legal requirements. The TVA Act requires us to collect revenues each year enough to pay our costs, our cash cost expenses, plus all of our interest charges.

And one of the DOE's suggestions, for example, is that we borrow money to pay interest on borrowed money. We think that is a clear violation of the TVA Act and our bond covenants.

Senator FORD. How many megawatts would $510 million cover?

Mr. STEFFY. Senator, there is not an answer for that. If you go back to——

Senator FORD. Well then, let me change it and ask you, can you supply over 4,000 megawatts to Paducah and Oak Ridge if you got the demand in the morning?

Mr. STEFFY. Yes, sir, we think we could.

Senator FORD. What would happen to the rest of your supply? Who would you cut off? Who would you curtail?

Mr. STEFFY. I think we could do it without cutting off or curtailing anyone. We may have to use our interchange with other utilities and purchase some power, but for a substantial portion of the year we would be able, we would have adequate capacity to supply them from our generating facilities.

Senator FORD. That would eliminate the demand charge? There would not be any charge then, would there, the $510 million in excess of the electricity used?

Mr. STEFFY. The $510 million charge is an ongoing charge that would be there, yes, sir.

Senator FORD. Well, are you telling me that, even if they increase it to the 4,000-plus megawatts, you would still add $510 million on top of that?

Mr. STEFFY. No, sir. They would be taking it and they would pay the $510 million.

Senator FORD. In the electricity used?

Mr. STEFFY. Yes, sir.

Senator FORD. Okay.

Mr. STEFFY. Well, yes, it would be part of their total bill, yes, sir.

Senator FORD. So it would not be—you would not stick another charge on top if they—if they request and received the total megawatts that are in the contract, the 4,000 plus, then we would not be talking about a $510 million surcharge or demand charge?

Mr. STEFFY. They would pay the $510 million demand plus they would pay a cost for each kilowatt hour of energy used. The demand charge is a continuing charge whether or not they use the power. They pay in addition for any energy used.

Senator FORD. Well, why would that continue to go up, then?

Mr. STEFFY. It would not go up. It would stay where it is.

Senator FORD. Well, it is getting ready to be $510 million plus next year.

Mr. STEFFY. The demand charge is set on a year to year basis, based on our fixed costs. And as those costs change through time, the demand component of our rates changes.

Senator FORD. So if you have a bad managed operation, then that bad management is passed on in your demand charge?

Mr. STEFFY. Our total fixed costs are passed through in the demand charge.

Senator FORD. Specifically, I guess you in your statement justified charging DOE for costs TVA is incurring for cancelled nuclear plants which are not needed by TVA? That is part of your demand charge, is it not, your fixed charges?

Mr. STEFFY. No, sir. What I said was that the amount that we are writing off associated with the cancelled plant is not appearing in our rates at this time. We are capitalizing—we capitalize all of the interest that we can associated with work, construction work in progress, and because of that we are able to defer the cost of cancelled nuclear plants and it will be deferred until later years.

Senator FORD. So you do not have any charge for construction work in progress?

Mr. STEFFY. On construction work in progress, it does not show up in our depreciation and neither does it show up in our rates. We capitalize an amount equal to the total amount of interest associated with construction work in progress.

Senator FORD. I am going to pass to Senator Johnston. My calculator is not doing very well up here.

The CHAIRMAN. Gentlemen, you signed the contract, as I understand it, that said you would pay demand charges based upon prevailing general power rates, which in effect may be revised after discussions.

Now, if that demand charge, presently $510 million, were based upon the prevailing general power rates which were in effect in 1967 at the time this contract were signed, what would be the size of that $510 million demand charge?

Mr. STEFFY. According to my memory, the demand charge when we initiated the contracts was about $1.50, and now the charge going to DOE is about $12. So it is whatever the difference between those two numbers is.

The CHAIRMAN. You have increased from $1.50 to $12?

Mr. STEFFY. Yes, sir.

The CHAIRMAN. What have your other rates gone up by?

Mr. STEFFY. They are part of the large industrial class, and the rate that we charge them, with some minor exceptions, is exactly the same rate we charge our other industrial customers.

The CHAIRMAN. On the demand charge?

Mr. STEFFY. Yes, sir, and the energy charge.

The CHAIRMAN. Well, but no one else is in this position of a demand charge as opposed to—as I gather from this thing, the demand charge part of this thing has gone up faster than your rates for energy, is that not right?

Mr. STEFFY. Well, that is true, since the variable cost, primarily the cost for coal, has done what it has done. In fact, during the seventies, when the cost of coal was rising rapidly, then our energy charge went up rapidly.

We reflect through our rates our costs just as they are incurred on our system. If they are fixed costs they go into the demand component of the rates. If it is a variable cost, it goes into the variable component.

The CHAIRMAN. I know that. But what you have done here as I get the picture, you have loaded it onto DOE. That is what DOE just said, and it certainly looks that way to me.

Now, tell me why that is not so?

Mr. STEFFY. We have not purposefully loaded it on DOE. We have structured our rates and have set our rates to recover through a demand component of the rates——

The CHAIRMAN. I know all that language about the demand component. But what you have done is you have put all these costs in there on DOE—nuclear plants not built or cancelled. You want to get well on your system by charging it to DOE.

I mean, I think that is pretty plain here. I mean, you are putting things on the fixed costs, you are charging for nuclear plants that are going to come on line after 1994, when DOE is going to be off the line, are you not?

Mr. STEFFY. No, sir. No, sir.

The CHAIRMAN. You have not cancelled any nuclear plants?

Mr. STEFFY. The construction work that we have in progress, the nuclear units that are going to come on line after 19 whatever, there is no cost associated with those plants in our rates. It is not in our depreciation charges, we are not recovering the investment costs, and we capitalize all of the interests associated with that.

Mr. CHRISTENBURY. Senator, if I could also add that the minimum payment contract is not something just special for DOE. If you look at our prepared testimony, one of the leading cases in the area involves Mobil Oil Company, which has a chemical facility in middle Tennessee which took a large amount of power. They shut down their facility three years before the end of the contract and were litigating the question of whether they had a duty to continue to pay.

These minimum payment contracts are not something where we simply carved out something special for the government to tack it onto DOE. We have these type of provisions with the many large contractors that we deal with.

The CHAIRMAN. Do you have many large contractors who are being charged a demand charge and not taking the electricity?

Mr. STEFFY. At the moment—I guess I should answer that. I frankly at the moment do not know. I can supply that for the record.

But we have traditionally over the years—it is a fairly common thing.

The CHAIRMAN. I know it is a common thing. Demand charges are common things. But it is also, you see an opportunity here where you have got one big demand charge where they are not taking the electricity. You treat them all alike, like—what did they say about the King of France treated rich and poor alike, prevented both of them from sleeping under the bridge.

Now, you treated both your—everybody alike, but there is only one in the class.

Mr. CHRISTENBURY. Senator, let me quarrel with that. True, DOE is today 17 times larger than our next largest customer. That means that the risk that we assumed in providing power to them was much greater than anyone else. But while Mr. Steffy will get you an answer currently, historically, as I indicated, the Mobil Oil case, the Carborundum case, and several others where we have litigated this issue are exactly the same factual situation we have with DOE, where you had a large user of power, they ceased to need the power several years before the contract was terminated, and sought to——

The CHAIRMAN. The demand charges are very clearly recognized, ought to be recognized, under the law. Nobody is disputing that.

The question is whether you fairly structured these rates. The phrase "revise," you pay the prevailing general power rates, which as I gather from this thing—and I would like to find out from DOE how the proportion of demand charges as opposed to electric charges varied from the initial prevailing general power rates to the revised general power rates.

I suspect we are going to find that the demand charges as a proportion of the total charge went up, whereas the charge for electricity went down. I think that is what those lines—you saw that little graph they had. Was that a correct graph?

Mr. CHRISTENBURY. I could only view it from the back, so I did not have a chance to see it.

The CHAIRMAN. What they show is the cost for electricity and power rates for electricity going down and demand charges going up. So what you are doing is treating everybody alike, but there is only one in the class and that is DOE, and that is big Uncle Sugar, as I call it, and you want to sock it to Uncle Sugar by revising your rates in such a way as to, in effect, not make it a general power rate, make it a rate applicable only to DOE.

Mr. STEFFY. Could I? There seems to be a perception we have recently done something in the way of revising our rates that affected DOE differently than other people.

The CHAIRMAN. You just said nobody else is having demand charges that is not taking the electricity. Is that not right?

Mr. STEFFY. I said I am not aware at the moment whether anybody else is in a minimum bill situation.

The CHAIRMAN. Then you just answered the question. Did you not just sock it to them?

Mr. STEFFY. No, sir. That provision has been in the contract all along.

The CHAIRMAN. What provision?

Mr. STEFFY. About payment of the minimum bill.

The CHAIRMAN. Of course it has. But when did you revise your rates?

Mr. STEFFY. That is what I am saying. We have done nothing different, nothing basically different in setting our—in how we set prevailing rates throughout the years. We went through a long ratemaking hearing process in 1984 and basically concluded to continue with the way we have been doing it. We made some minor changes, but they truly were minor.

The CHAIRMAN. It looks like you went from $1.50 to $12. That is not minor, is it?

Mr. STEFFY. We have adjusted our rates as costs have gone up during the years, but we have done nothing basically different in how we structure our rates.

The CHAIRMAN. DOE just had a chart up there that showed the demand charges going this way and electric charges going that way. Now, that looks like a change to me.

Mr. STEFFY. That simply reflects the change in our basic cost structure. Our fixed costs have gone up and our variable costs have not.

The CHAIRMAN. Yes, but you can put certain things in here over here on your cost structure. You know, if nobody is questioning how you do that, you just say, this is a cost that goes to DOE, so the rates go up.

Senator FORD. Did you not in 1984 go to system-wide charges?

Mr. STEFFY. I am not familiar with that term, system-wide charges.

Senator FORD. That you changed your procedure and everybody paid the same across the board system-wide?

Mr. STEFFY. No, sir.

Senator FORD. What were the minor changes you made in 1984?

Mr. STEFFY. The minor changes were related to which costs are fixed and which costs are variable as to determining the demand charge.

Senator FORD. I am going to tell you, I wish I had studied utilities in school, utility rates, and knew more about how to follow your lingo.

I believe we are getting it here.

The CHAIRMAN. I do not know enough about these rates. I will know by the time we legislate.

Let me just make one statement, and that is the picture is coming through pretty clear to me. And I am not going to make a judgment based on what I know now, but we will find out about how these are made. It seems to me pretty clear that it is not fair.

And what I would suggest to you all is that you get together with DOE and work this thing out. I understand they have said they were willing to do that, because this is one Senator who is in fact, if the picture is as I think it is, is not going to let TVA just sock it to DOE and pay for everything, you know, a champagne and caviar expense account, to let the good times roll. We are just not going to do that.

It is not fair. You have got plants that you cancelled that were going to be built, to make this charge—and you are just subsidizing your whole system based upon this, as I understand it.

Now, if I turn out to be wrong I will duly admit and acknowledge that. And I invite you to tell us where we are wrong in writing. We also are going to invite TVA to do that—I mean DOE.

But I wish in the meantime that you would make a serious effort with DOE to get this thing compromised, because it looks to me like the contract was relatively not clear. It was a bad job of drafting to say they can revise after discussions.

I think I know what they meant. They thought they were going to be treated like everybody else, and that would be fair. They turned out to be the only one in the class.

In any event, Mr. Chairman, I hope they will get it done by negotiation rather than to have us determine it for them.

Senator FORD. I agree.

Senator Evans.

Senator EVANS. Do I understand correctly that the demand charges which you are now laying on the Department of Energy—well, how much, for how many megawatts are those demand charges?

Mr. STEFFY. The total megawatts under the contract is 4,485 megawatts, and the demand charge is $12.05 per KW. And their total bill is reduced five percent because we do not pay payments in lieu of tax on sales to federal agencies.

Senator EVANS. You do not give them anything off for volume?

Mr. STEFFY. No, sir.

Senator EVANS. 4,485 megawatts. How much are they drawing today?

Mr. STEFFY. They are taking the energy associated with about 100 megawatts.

Senator EVANS. So there is 4,385 megawatts. But they are paying a demand charge, so they are—under the contract they could ask for and receive 4,385 megawatts of energy they are not now receiving, is that correct?

Mr. STEFFY. Yes, sir.

Senator EVANS. Where would you get 4,385 megawatts of power tomorrow morning if they were to put that demand on you?

Mr. STEFFY. We have a large electric generating capacity.

Senator EVANS. I know all that. Where would you get 4,385 megawatts? Are you buying power now or do you have sufficient power to meet all of your current loads with the generating facilities of the TVA?

Mr. STEFFY. Let me take just a moment and answer that question, because it varies from day to dav

Senator EVANS. I understand that. I spent several years on the Pacific Northwest Power Council. I am halfway familiar with it.

Mr. STEFFY. We are buying power nearly every day, not every day, but nearly every day. Much of the power we are buying, nearly all the power we are buying, is because of economy reasons, not because we cannot generate it with our own capacity but because we can buy it more economically on the interchange.

So we are buying power. Yet we have available capacity in standby situations. Much of the time, we have 4,485 megawatts that we could crank up and supply the Department of Energy.

Senator EVANS. If they put on you 4,385 additional megawatts on a consistent basis, said we need it every day from now on, are you asserting that you have that power readily available?

Mr. STEFFY. I am asserting that we could supply that power, yes, sir.

[The information follows:]

EVANS

Question: If they put on you 4,385 additional megawatts on a consistent basis, said we need it every day from now on, are you asserting that you have that power readily available? Would you submit for the record more specifically how you intend to do that?

Answer: TVA can supply 4,485 MW of power to DOE and still meet the power requirements of the rest of its customers.

The installed generating capacity for the TVA power system is approximately 32,000 MW. Excluding TVA's nuclear plants, which are temporarily shut down, TVA still has in excess of 26,200 MW of nonnuclear generation available on its system. Moreover, TVA's system, by virtue of investments in system interties and a strong system-wide transmission grid, has the capability of importing thousands of megawatts of power from neighboring electric systems (which are in current excess capacity situations and are actively seeking market opportunities). To put TVA's system capacity situation in perspective, TVA's peak load this past winter was 19,660 MW. (There were, of course, lesser load levels at other times.)

In addition to the above mentioned resources, TVA has other power supply alternatives and options at its disposal which serve to enhance TVA's capability of meeting all its firm loads at peak times. TVA, utilizing one such resource, can exercise contract rights to interrupt delivery of power under a variety of interruptible contracts. This, of course, is available if needed for firm load supply.

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Senator Evans. Would you submit for the record more specifically how you intend to do that?

Mr. Steffy. Yes, sir.

Senator Evans. Because it would have to include what you are now doing, where you are now getting power, and what idle plants or what other facilities would provide that.

Mr. Steffy. It would include some, at least a part of the time, purchases from other systems.

Senator Evans. If in fact they have anything to offer to you at the time.

Mr. Steffy. Yes, sir.

Senator Evans. Do you have any contracts with them now that would ensure that they would sell you that power?

Mr. Steffy. We deal on the interchange, of course, on an hour to hour and day to day basis, and there is plenty of power in the utilities surrounding us at the present time. We have had a contract this winter for supply of power from the surrounding utilities.

Senator Evans. Do you think it is legitimate to make a demand charge on an outfit like DOE, taking these current circumstances, when you know very well that in order to supply the energy necessary you would have to buy power from other utilities for which you have no contracts whatsoever currently?

You just say there is plenty of power out there, but you have no contracts that would assure that that power would be delivered to you. If they chose not to give it to you, you have no right to take it, isn't that correct?

Mr. Steffy. Well, yes, sir, that is correct.

Senator Evans. Well then, how in the world can you make a charge on a customer, a demand charge, and if they place the demand on you you have no assurance whatsoever that you can get that much power to deliver?

Now, that is a con job. When you say that you are going to charge people to ensure that power is there and then you have no contracts and no current ability to consistently provide that power, I think you are charging them too much.

And I think that, for the record, I hope that you will explain why I am wrong in that assertion.

Senator Ford. Thank you, Senator.

Senator Johnston, do you have anything else?

The Chairman. No.

Senator Ford. TVA is a very important operation in my state. The uranium enrichment is also very important in my state. The uranium enrichment is a national security problem, in addition to other items. And I am very hopeful that we can find some way to not damage TVA, but also put the uranium enrichment in a posture of reducing their costs so we can continue to improve our sale of SWU's, rather than losing an international market.

And it may be that we will have to subsidize that if we continue on the route we are going, just for national security reasons. I intend not to let the national security posture of this decline in any way.

We have basically two government entities; one is holding the other one basically ransom, as I see it, based on a contract that was signed in 1967 and a demand charge that has gone in that period of time from $1.50 to better than $12. So I hope that we can get together.

And I know that, as I told you earlier, Mr. Christenbury, I heard a lawyer say one time: Go either way you want to and we will make a good case. And I understand that you are going to make a good case.

But I hope, for the sake of the industry, for the sake of the security of this country, and for the well-being of TVA, we can find a way to satisfy both concerns. I hope you all will do that.

And I intend to work with you, but I intend also to be sure that the security item is uppermost in my mind.

Thank you all very much for being here.

Mr. CHRISTENBURY. Thank you, Senator.

Senator FORD. The next witness is Mr. William Lee, Chairman and Chief Executive Officer of Duke Power Company. He is here today on behalf of the American Nuclear Energy Council and the Edison Electric Institute.

Welcome, Mr. Lee. We are delighted to have you, and you can summarize your statement or however you please. It will all go in the record.

STATEMENT OF WILLIAM S. LEE, CHAIRMAN, DUKE POWER CO., ON BEHALF OF THE EDISON ELECTRIC INSTITUTE AND THE AMERICAN NUCLEAR ENERGY COUNCIL

Mr. LEE. I will summarize it, and I have filed copies of my full testimony with the Committee.

Senator FORD. It will be included in the record, Mr. Lee.

Mr. LEE. Thank you very much.

Let me first discuss uranium enrichment and then the two interrelated subjects you have been touching on today, uranium supply and the cleanup of mill tailings at the uranium mills.

First, with respect to the Department of Energy's uranium enrichment business, in my view it is headed straight toward failure. This is for two reasons: One, the prices they are charging for separative work units are not competitive in the world marketplace; and two, the governance of the U.S. uranium enrichment business and its structure make success in a competitive world market impossible.

Let me amplify first with respect to pricing. It is possible to buy enrichment services either overseas or from potential new plants in the United States at well below $100 per SWU. For comparison, DOE's current price is $119. On behalf of our consumers, we utilities must consider the lower price that we can now find in the marketplace.

For this reason my company, Duke Power, was prepared to give DOE notice of cancellation in accordance with the terms of our contract a year ago. DOE extended the date under which such notice could be given without penalty until this coming April. That is next month.

We were prepared this month to give them notice again of termination, and they further extended that date yet another year without penalty. Thus, they are simply postponing the inevitable unless something changes.

We cannot justify doing business where prices are 30 to 40 percent higher than we can buy enrichment services elsewhere, either overseas or a new plant built in this country.

[The prepared statement of Mr. Lee follows:]

Statement of
William S. Lee, Chairman
Duke Power Company
on Behalf of
Edison Electric Institute
and the
American Nuclear Energy Council
to the
Subcommittee on Energy Research & Development
Committee on Energy and Natural Resources
U.S. Senate
on
Uranium Supply and Uranium Enrichment
March 13, 1987

I am William S. Lee, Chairman of the Board of Directors and Chief Executive Officer of Duke Power Company. My statement is on behalf of the Edison Electric Institute (EEI) and the American Nuclear Energy Council (ANEC). EEI is the national association of investor owned electric companies. Its members serve approximately 73 percent of all ultimate electricity customers in the nation. They operate 95 nuclear plants and currently have 9 additional units under construction. ANEC represents over 100 organizations having an interest in nuclear energy, including investor, public and cooperatively-owned utilities, manufacturers, architect-engineers, uranium mining companies (both domestic and international) and various other firms engaged in the nuclear fuel cycle. Duke Power Company currently operates seven nuclear units in North and South Carolina. The nuclear utilities are the major uranium enrichment customers of the Department of Energy (DOE) and the primary domestic commercial users of uranium.

For the United States industries to participate effectively in the world economy, they must serve competitive markets on a reliable basis, and this requires the availability of an economical supply of electricity. With this in mind, electric utilities support unrestricted access to an open and competitive market place for uranium supply, enrichment services, and other fuel cycle services and requirements. History has shown that open and competitive markets promote innovation, as well as the efficient allocation and utilization of resources.

Electric utilities desire that a competitive market exists domestically for fuel cycle services and requirements, including uranium supply and enrichment services. A domestic market provides assurances of the reliability of product delivery and the economic benefits associated with additional domestic industry, as well as insulation from changes in foreign relations and fluctuations in the international value of the dollar.

Electric utilities have an obligation to provide an adequate, reliable supply of electricity to their customers at a reasonable price. To do so, they continually strive to effectively manage expenses, which are ultimately paid by their customers. This is especially so for fuel costs, which represent a large percentage of electric utility expenses.

To the extent that artificial barriers to free trade result in higher fuel prices, electric utility customers will pay higher rates, and U.S. industries, such as textiles, will become less competitive. Thus, electric utilities are acutely aware of the often seemingly competing interests of domestic fuel supply and security, on the one hand, with the interests of other domestic industries and the consuming public on the other -- interests which are complex and have both near and long term implications. It is with this full awareness that I provide comments first on uranium enrichment and then on two interrelated subjects, uranium supply and the stabilization of uranium mill tailings.

URANIUM ENRICHMENT

The DOE uranium enrichment enterprise is headed for failure. Simply put, the enterprise is not competitive in the world market place. In 1974, DOE was charging commercial customers \$36 per Separative Work Unit (SWU). By 1983, the price had risen to a range of approximately \$140 to \$150 per SWU, depending on contract terms. This is an increase of over 385%! In 1987, DOE is generally charging commercial customers \$119 per SWU, depending on contract terms. Although this price shows the progress DOE has made in reducing costs, it also demonstrates graphically DOE's lack of competitiveness in the world market. Prices for enrichment services obtained overseas are less than \$100 per SWU.

One of the major reasons for DOE's higher prices is the issue of "unrecovered Government costs." The Office of Management and Budget (OMB) claims billions of dollars are owed to the

U.S. Treasury by DOE's commercial customers. Although OMB's position is understandable due to their desire to balance the Federal budget, the fact is that DOE's commercial enrichment customers are not indebted to the U.S. Treasury because revenues from commercial customers have exceeded the costs of providing the service to this customer segment. Obviously this situation is unacceptable to electric utilities and their customers.

In addition to pricing, organizational structure was identified in 1984 as a major reason for DOE's non-competitive posture by the Tri-Committee Business Advisory Panel on the Department of Energy's Uranium Enrichment Enterprise. This panel of business experts was established in April 1984 by three committees of the U.S. House of Representatives to review DOE's program management plans for the uranium enrichment enterprise and to evaluate whether they provide a good long-term strategy for the management of the enrichment program. The chief finding of the panel was:

> The current management at the Office of Uranium Enrichment has made progress in going from a technology-driven to a market-driven mode of operation. However, there is an urgent need for further improvement, and DOE should accelerate the transition.

As a result of this finding, the Panel recommended that:

> Congress and the Secretary of Energy should take steps to establish a private business management structure for the enrichment enterprise. Alternative institutional structures under Government ownership should be examined. The proper structure would further the business objectives of the enterprise and be compatible with an approach to privatization of enrichment services.

No visible action has taken place on implementing this recommendation.

In response to the non-competitive position of DOE's enrichment business, it is reasonable to assume that electric utilities and DOE's foreign customers are presently developing alternative plans for obtaining enrichment services. In fact, because of DOE's lack of competitiveness, a number of electric utilities, including Duke Power Company, were prepared to give DOE notice of cancellation on the April 1, 1986 notification date called for and in accordance with the terms in the enrichment contracts. This notification date was subsequently delayed by DOE until October 1, 1986; then until April 1, 1987; and just recently until April 1, 1988. The electric utilities await actions by Congress and DOE to provide a market-driven management structure. Failure to take such actions will prompt the electric utilities to act in a manner that is in the best interest of their customers.

DOE Uranium Enrichment Enterprise Payments to Treasury

DOE has promulgated a revised enrichment services criterion, 10 C.F.R. 762.6, calling for recovery of $3.5 billion claimed to represent prior unrecovered Government enrichment services costs. The costs are to be recovered as a component of prices charged to DOE civilian enrichment services customers. The electric utility industry does not accept the Administration's and DOE's premise underlying the rule, namely that the enrichment program has accumulated unrecovered costs in serving civilian customers. DOE has neither demonstrated an adequate accounting basis for any of the alleged unrecovered costs, nor established that a debt exists. The retroactive recovery plan is wholly unacceptable.

The DOE enrichment enterprise has operated for almost two decades by setting prices based on the recovery of Government costs over a reasonable period of time. There has never been a debt issued to finance alleged unrecovered costs or any indication that there would be a retirement program for such a debt. Rather, DOE is now seeking to characterize its investment, or equity, in the enrichment program as "unrecovered costs" or a debt. The initial assets transferred to this program consist of facilities which were originally constructed for the defense program in prior decades. Newer facilities were built with funds equivalent to a portion of the enrichment revenues that utilities paid. Inclusion, retroactively, of additional payments equivalent to the original value of the initial assets is not consistent with Congressional intent nor sound national policy objectives.

The DOE approach represents a major change in the basic policy under which the uranium enrichment program has operated for almost two decades. This new approach does not reflect the understanding of the domestic commercial customers who have previously contracted for future enrichment services from the

Federal Government. In the past, prices were set, each year, on the basis of recovery of Government cost, as mandated by Section 161v of the Atomic Energy Act of 1954, as amended, and the customers paid for services on that basis. Utilities were never informed that recovery was not taking place and that some amount of additional Government costs was to be carried forward to be "recovered" at a future date. In fact, The General Accounting Office (GAO) has stated in a letter of August 10, 1984, to Congressmen Dingell and Ottinger that:

> DOE is not required to have a formal plan for repaying the Treasury for the government's cost of providing uranium enrichment services, nor does the legislative history indicate that the Congress intended the program to make specific payments to the Treasury as is the case for some other programs.

This new and unique cost recovery concept raises serious questions regarding the validity of all civilian customer contracts with DOE which were signed prior to this new approach. If DOE attempts to have the electric utilities and their customers pay to the Treasury, through the enrichment program, approximately $3.5 billion to "recover" alleged unrecouped Government costs, a number of utilities must seek alternative suppliers for enrichment services where such excess costs are avoided. Much of the financial burden to continue operating the enrichment facilities to supply defense needs along with a lesser share of the civilian needs would then shift to the nation's taxpayers.

Congress, recognizing the need for a thorough and complete examination of this issue, stated in the Continuing Resolution passed last fall that the determination of how much, _if any_, money should be paid by the enrichment program to the Treasury as a "prior unrecovered cost" would be decided by Congress and not by either DOE or the Administration. Nonetheless, DOE has already paid into the Treasury, in FY 1986, the sum of $91 million for such costs, and expects to pay, in FY 1987, an additional $160 million. Furthermore, the FY 1988 budget calls for the payment of an additional $231 million. The electric utilities urge Congress to act quickly to address this issue and to prohibit DOE from making payments to the Treasury (for "prior unrecovered costs") from enrichment program revenues until the concept of such costs has been reviewed in detail and resolved in an equitable manner. If sound methodologies are utilized, such a review would result in findings that no prior unrecovered cost exists. Even if Congress decides that such an obligation exists, it certainly would not be of the magnitude of $3.5 billion.

GAO, in its recent evaluation of the "Government's unrecovered enrichment costs," has suggested a methodology that does not recognize an appropriate allocation of these costs for purposes other than serving commercial customers. Likewise, the methodology does not recognize the specific guidance provided by Congress in its annual budget reviews. Specifically, GAO defines the total Government cost as the sum of: (1) the Government's initial investment in the program, (2) all appropriations, and

(3) imputed interest. This simplistic methodology ignores or inappropriately dispenses with:

- The direction provided by the Joint Committee on Atomic Energy, to the Atomic Energy Commission, when the initial criteria were established and subsequently modified;
- The annual Congressional budget reviews in which Congress concurred that program revenues were in fact offsetting operating expenses, including the cost associated with research and development and the expansion of the production capacity;
- The lack of Congressional authorization for DOE to establish a liability account for the enrichment activity (such an account would have indicated any costs that were accumulating);
- That the enrichment facilities fulfilled their primary defense purpose and were made available to provide services to civilian customers (there was never any intention that the civilian customers were to purchase these facilities);
- The appropriate allocation of portions of those costs incurred for defense reasons;
- The appropriate allocation of portions of those costs incurred for non-proliferation/national security reasons; and
- The program appropriation values that were not actually spent by the Administration in the enrichment program.

DOE, in conjunction with OMB, appears to have taken an approach which addresses the need to write-off assets that will not be used in future enrichment operations. However, like the GAO approach, this approach appears to improperly dispense with the first six items listed above. Congress should review the GAO and DOE/OMB methodologies carefully, in light of the above concerns, before it approves the concept that prior unrecovered costs exist (and the amount, if any, of such costs) before authorizing any further payments to the U.S. Treasury using civilian revenues from enrichment services.

A reasonable and supportable approach to determine if there are legitimate prior unrecovered costs applicable to civilian customers is to subtract the civilian revenues received each year, since 1969, from the enrichment program outlays made each year for serving civilian customers. This approach defined the total civilian, defense, and non-proliferation enrichment program outlays over the period from 1969 through 1984 as $14,880 million; but this amount must be reduced to account for production costs of $1,430 million that should have been allocated for defense enrichment, leaving outlays for civilian customers of $13,450 million. When total civilian revenues of $13,320 million are subtracted from the outlays, $130 million remain, which might be assigned as net outlays for the civilian enrichment activity.

Since these outlays occurred in different years over the sixteen year period, it may be appropriate to apply an imputed interest value on the net yearly outlays. Such an imputed interest value appears to be about $220 million. The sum of the $130 million civilian outlays, and the imputed interest thereon of $220 million, provides a total of $350 million for net civilian outlays plus interest.

Even this analysis actually overstates the real net outlays for civilian services because it does not recognize a cost for specific facility expenditures required for safeguarding high enrichment uranium produced for defense purposes. Additionally, no recognition is given for the costs associated with the Government's non-proliferation/national security policies. Electric utilities believe that in fact the commercial customers subsidized the defense and non-proliferation policies of the Federal Government.

To summarize, in our view the DOE cost recoupment plan exceeds Congressional intent. Congress never intended such a plan, and its retroactive application is grossly unfair to electric utilities. No debt has been demonstrated to exist. Moreover, if sound accounting methodologies were used -- properly allocating costs to all appropriate program objectives -- DOE could not support its claim of a $3.5 billion debt. In the end the DOE cost recovery plan will serve only to keep prices to commercial enrichment customers higher than those available from DOE's competitors. Therefore, at a minimum, the policy is inconsistent with the objective that DOE must remain competitive in today's marketplace. Future pricing of enrichment services to commercial customers should be established on a basis of participation in the competitive market.

DOE Uranium Enrichment Enterprise Organization

As previously noted, the Tri-Committee Panel's chief finding was that there is an urgent need for a market-driven mode of operation for DOE's uranium enrichment program and that DOE should accelerate the transition to this mode of operation. As such, the electric utilities strongly support a restructuring that would establish an improved system for providing competitive enrichment services within the United States to meet the needs and service requirements of domestic commercial customers, foreign commercial customers, and U.S. defense programs. The ultimate goal should be privatization of the program. However, as a first step, Congress should proceed rapidly with the commercialization of the program through the creation of a government corporation. Such a step would allow the program to be more responsive to customer needs, allow the continued introduction of more businesslike practices, and provide a cautious and prudent step toward privatization.

For many years the United States enrichment enterprise operated as a monopoly. This lack of competition allowed the United States to use the supply of enrichment services as a foreign policy tool and to follow a capacity expansion program which was driven by that policy, as well as by optimistic growth forecasts for nuclear power and a premature commitment to investment in new technology, rather than to follow a plan driven by market forces.

In recent years, the Department of Energy (DOE) has recognized the realities of the marketplace and has given increased attention to the business aspects of the uranium enrichment program. This had become critical since the rise of international competition and secondary market sales seriously eroded DOE's market share and placed severe financial constraints upon the program. Electric utilities applaud the transition to a more businesslike approach that has taken place at DOE and strongly endorse its continuation.

However, the U.S. enrichment program faces some difficult challenges. DOE has lost a large share of its market, and it is burdened with excess production capacity and a shortage of revenues needed to finance technology improvements. DOE's enrichment price is currently the highest in the world. Also, the location of the enrichment program below the Assistant Secretary level within a cabinet department with numerous responsibilities makes it difficult to respond rapidly to the demands of the marketplace when that is necessary. In addition, the limitations of the Federal pay scale make it difficult to provide the incentive-reward structure needed to retain the best available managers for the program.

Electric utilities believe that operation of the enrichment program in the manner of a private corporation is highly desirable. However, the prospects for actual privatization are uncertain. It could be a number of years before arrangements for complete transfer to the private sector can be arranged in a way which is acceptable to all parties (Congress, the Administration, private enrichment interests, customers and financial institutions). In the interim, an alternative institutional structure which can rapidly further the business objectives of the enrichment program is needed.

The organizational structures of Conrail, Comsat, and the U.S. Postal Service are examples of successful models upon which a restructured enrichment program might be based. Numerous other approaches, including the possibility of an independent Federal enrichment administration may be suitable. Electric utilities support the commercialization of the enrichment enterprise through the formation of a government corporation. Such an organizational structure would not only promote more businesslike practices, but would be a cautious and prudent step toward privatization of the enterprise.

The enrichment program must optimize its long-range plan for production, inventory accumulation, and capital spending, even if it creates imbalances between costs and revenues in the short-term. The Congress and the Administration should recognize that such long-range optimization is in the best interests of the taxpayers and those who are employed locally, as well as electricity consumers.

Whatever the new structure is, electric utilities believe that it is important to minimize political intervention and provide the organization sufficient freedom to apply businesslike practices. In addition, electric utilities believe that a permanent board of business executives should be established to advise the enrichment program. While the executives might not have the authority of a board of directors in a private corporation, they would bring vital business experience to the program.

Advanced Enrichment Technologies

The Tri-Committee Panel stated that one of the most important decisions facing the management of the DOE enrichment program involves the selection and acquisition of new, more cost-efficient enrichment capacity. As such, a few comments on advanced enrichment technologies are appropriate.

The United States has led the world in the development of commercial nuclear power, including uranium enrichment. In 1969, the United States began meeting the expanding enriched uranium needs of industry with the gaseous diffusion plants, which are still the basic workhorses of U.S. enrichment capability. The two operating gaseous diffusion plants (GDP's) at Portsmouth, Ohio and Paducah, Kentucky have sufficient capacity to meet U.S. production requirements through the end of the century. However, because they are very energy intensive, their ability to remain competitive is subject to their cost of electricity.

New enrichment technologies are less energy intensive and may offer additional advantages. Two major technologies have been developed by DOE: gas centrifuge and atomic vapor laser isotope separation (AVLIS). In May 1985, AVLIS was selected over the Advanced Gas Centrifuge (AGC) process as the advanced enrichment technology that DOE would use to eventually replace gaseous diffusion, and it is being developed at Lawrence Livermore National Laboratories (LLNL). It should be noted that the AVLIS process also is being actively pursued by France and Japan. Since AVLIS may be able to offer enrichment services at costs less than $40 per SWU, this could dramatically reduce nuclear fuel costs, as enrichment constitutes about 40% of these costs.

Electric utilities recommend that Congress continue its funding for DOE to develop advanced technologies for enrichment. Such efforts must be carefully aimed at answering key technology and engineering questions in a cost-effective manner so that the goal of achieving a lower cost enrichment process will be met. To the extent that the AVLIS process appears to offer reasonable expectations for lower costs, electric utilities support the effort on a modest basis with appropriate scale-up steps. Congress should continue with its funding so long as AVLIS continues to offer the expectations of more cost-efficient enrichment capacity. The decision to deploy the AVLIS technology should be based on economic grounds characteristic of any well managed businesses.

URANIUM MILL TAILINGS

Owners and licensees of the active uranium mill sites have the responsibility to stabilize the mill tailings in accordance with applicable federal and state regulations and to decommission the mills at the end of their useful lives. This responsibility is backed up with surety bonds or other financial arrangements, as a condition of having a license.

The "Uranium Mill Tailings Radiation Control Act of 1978" provided for the reclamation of uranium mill tailings. Basically, sites were divided into two categories: Title I (sites inactive as of 1978) and Title II (sites active in 1978 and since). Reclamation of the inactive, Title I, sites was specifically provided for in the Act. Reclamation of Title II sites was the responsibility of the mill owners who were required to post financial surety bonds with the NRC as a licensing condition. There are about 25 Title II mill sites in the U.S., and the list of corporate owners for most of them include some of the largest companies in our country, and at least one major foreign company.

Electric utilities have paid for initial mill tailings stabilization under prior uranium supply contracts. Subsequent changes in the stabilization criteria, however, presently require additional treatment of the mill tailings. While the spot market price of uranium has been depressed for sometime, much uranium has been sold to electric utilities from the mid-1970's to date under contracts which provided large profit margins, believed to be more than sufficient to offset a share of mill tailings stabilization costs which might, as some have suggested, be retroactively charged to the utilities. The electric utilities believe that the states, the Federal government and the uranium producers should pay the lion's share of the cost of that stabilization. To impose yet another tax on the electric utility customer is inappropriate and unfair. Should Congress desire to provide additional assistance for domestic mill owners, as part of a comprehensive legislative package, then the electric utility industry will work with Congress to formulate reasonable legislation that will not adversely affect the electric utility customer and the competitiveness of U.S. industry.

URANIUM SUPPLY

Electric utilities support the principal of free international trade for commodities, including fuels. Trade restrictions and import fees or taxes on equipment and energy forms, including petroleum, gas, coal, and uranium, are unacceptable and usually counterproductive, because they would result in higher costs to electricity customers and make American industries less competitive in world markets.

The future domestic demand for uranium to fuel civilian nuclear plants, now operating and those under construction, will increase to nearly 40 million pounds of U_3O_8 annually within the next ten years. Most predictions during the 1960's and early 1970's suggested that uranium would be in short supply, and the total domestic and foreign uranium ore reserves would be called upon to serve the growing civilian nuclear industry. However, since then, very large high grade uranium ore bodies have been discovered and brought into production in Canada and Australia. The cost of producing uranium from these ore bodies is significantly less than the average cost of producing uranium from many domestic mines. Any barriers that might be imposed to prevent these lower cost ore bodies from being called upon to meet domestic requirements would result in a higher price for uranium and a corresponding adverse impact on electricity customers.

Utilities would like to purchase domestic uranium as long as it is priced competitively. In fact, it is in the long range interest of electricity customers to have the security of an available domestic supply of moderate size in the event it is needed. Domestic uranium reserves probably can be mined on a competitive basis to provide an average of approximately 16 million pounds of U_3O_8 each year beginning in the mid 1990's, at least 30 percent of the requirement for civilian nuclear plants in the U.S. Thus, a significant portion of the domestic uranium requirements and a modest uranium export business are expected to be filled by competitive domestic suppliers in an unconstrained marketplace. An artificial trade barrier that ignores the marketplace and forces the development of premium priced reserves is, therefore, not only undesirable but unnecessary.

One complicating aspect of the domestic supply picture is that some domestic suppliers have turned to the procurement of foreign uranium to satisfy their supply contracts for the delivery of uranium to domestic utilities. In fact, during the past two years, domestic uranium suppliers have imported nearly as much foreign uranium, to fill their existing domestic utility contracts, as has been imported by utilities.

Should Congress desire to provide assistance to the domestic uranium industry, then it should do so only in a manner which does not drive up electricity prices and adversely affect the ability of other U.S. industries to compete internationally. One possible alternative may be to offer matching sales of uranium from the U.S. stockpile to domestic producers for uranium actually mined and milled in the U.S. to average down production costs. This approach would increase the profitability of the domestic uranium supply industry by encouraging additional domestic mining activities and reducing average costs, as well as helping to lower the Federal deficit. In any case, trade or usage restrictions on uranium are unnecessary and will only hurt electricity customers and the competitiveness of U.S. industries in the world market.

SUMMARY

Electric utilities have an obligation to their customers to provide an adequate, reliable supply of electricity at a reasonable price. In support of this, electric utilities have the following positions:

1. The DOE uranium enrichment enterprise is not indebted to the U.S. Treasury. In fact, if charges were properly assigned between commercial, defense, and non-proliferation/national security activities, it is probable that revenues from civilian customers have already subsidized these non-commercial enrichment programs..

2. The DOE uranium enrichment enterprise should be commercialized as a government corporation, as recommended by the Tri-Committee Panel in 1984. This should be a first step to eventual complete program privatization.

3. The enrichment enterprise should continue efforts to develop advanced enrichment technologies as long as these activities are based on realistic prospects for ultimately lowering the cost of enrichment services. This will provide support for the long term competitiveness of the enterprise.

4. The stabilization of mill tailings at active sites by mill owners is a cost of doing business. Electric utilities have already paid for mill tailings stabilization under their prior uranium supply contracts and additional payments would be unfair to electric utility customers.

5. The principle of free trade for all commodities, including fuels, is strongly supported. Trade restrictions, and import fees or taxes on foreign origin suppliers and services result in higher cost to electric utility customers and are, therefore, inappropriate.

Electric utilities recognize that the issues surrounding uranium supply and enrichment are numerous and complex. It is understood that all parties may not feel strongly about all of the above issues. However, because the issues are interrelated, in as far as they all affect the cost to the consumer of the electric utility industry's fuel supply, they must be dealt with jointly.

A national policy needs to be defined concerning the important and strategic functions of uranium supply and enrichment. Electric utilities believe that comprehensive legislation is an appropriate vehicle to develop the needed policy and resolve the issues describe. However, time is running out, 1987 is the year to resolve these issues. The electric utilities offer their full support and assistance in developing a comprehensive policy that will resolve the issues described in a manner that will benefit both the country and the electric utility customer.

Senator FORD. Mr. Lee, would you say they are just refusing to take the phone call?

Mr. LEE. Senator, I do not believe so. I believe that, where DOE's management practices are good, the government system and the structure and the conditions imposed upon them make it impossible for them to compete.

One of the reasons their prices are higher is this ludicrous type of war between OMB and DOE about how much unrecovered costs still exist in the uranium enrichment facilities. I wish I could have said the words as clearly as Senator Evans did earlier this morning.

OMB would claim billions of dollars, and I can understand that because they are anxious to balance the federal budget. Any fair allocation of costs of enrichment done for our military programs and for our national security and nonproliferation purposes over the years would clearly demonstrate that the civilian sector not only does not have any unrecovered costs, but has indeed supported the military program.

So the zeal to balance the budget imposes what is in effect a new tax of $25 or so per SWU that has no basis in fair accounting and will make DOE's enrichment business even less competitive in the marketplace.

Now, briefly to the governance issue. Please bear in mind that for the enrichment enterprise to be successful in the world marketplace it must be run like a competitive business and not as a part of government. DOE has made progress, but it is still non-competitive.

Today it is managed far better than it is governed. I do not know of any enterprise that can compete effectively in worldwide markets, including the flexibility to adjust to those markets, with the bureaucracy of the enrichment enterprise that must be contended in the federal structure.

OMB attempts to maximize current revenues, without regard to long term impacts. The Congress has at least six Committees giving oversight to the uranium enrichment enterprise. These Committees change membership in some cases every two years. The Administration changes every four to eight years. DOE senior management changes more frequently.

So no matter how well managed the operations of the enrichment business may be day to day, it is impossible to compete with such a ponderous government structure. The enrichment enterprise must have: first, clearly defined long range goals that do not change every two years; and second, the freedom to implement plans geared to achieving those goals.

Two and a half years ago, it was my privilege to serve, at the request of three House Committees, as the chairman of a panel of business experts established to review DOE's management plans for the enrichment program and to evaluate whether they provide a good long term strategy. Our panel urged the Congress to move toward restructuring of the enrichment business so that it could compete and be run on a businesslike basis.

Nothing has really happened since then. In the interest of the consumers that my company serves, many of those consumers are competing with the products they make in worldwide competition and they do not want to pay any more for electricity than they can help because their jobs, the jobs they provide, are at risk.

It would not surprise me, then, to see a number of other utilities and DOE's foreign customers do like our company has done, and that is look for the less costly supply, because—until we can get rid of the paralysis under the present system of government.

So my recommendation to you, Mr. Chairman, and the Committee and the Congress would be to recognize and verify there is no unrecovered cost applicable to the civilian sector. Let us do that right away, or you will lose your enterprise to competitive forces.

You must do that with urgency or our company and a number of others have no choice but to cancel our contracts and sign contracts with others. Our consumers deserve that sort of treatment.

Second, proceed without delay toward constructing, first, a quasi-corporation, still government-owned or chartered, but set it up so that restructuring or moving to the commercial market can occur if later justified, but meantime it will be a federal corporation.

The first step there would be to give the corporation more nimble governance that it must have. You can model the enterprise after some combination of Comsat and Conrail, set up a board of directors that can respond to the marketplace and to operational forces.

We cannot come running to the Congress every time the world price changes because you, with all respect, sir, simply cannot act fast enough or be nimble enough for a timely response to changing world price conditions.

And this seriously threatens the bankruptcy of our enrichment business, and I am personally distressed that we have really frittered away some two and a half years. We do not need any more studies. We seriously propose that you get on with this now.

Briefly to the related matters, then, Mr. Chairman, of uranium supply and mill tailings. Last year our industry was willing to support a coupling of those two issues with the enrichment debt issue. We were willing to acquiesce to a tax to help clean up mill tailings and we were willing to acquiesce to a reasonable limitation on the import of uranium, while grandfathering existing uranium supply contracts, all in order to strengthen the domestic mining industry, albeit at a higher price for uranium, and all of that in exchange for lower enrichment prices by eliminating that fictitious debt.

As we look at each of these issues now, they are interrelated inasmuch as they all affect the cost to consumers of our fuel supply. With respect to mill tailings, our long term contract prices, we felt, included the cost of initial cleanup. Subsequently, cleanup criteria changed and now the regulations require additional treatment of mill tailings.

While the spot market price of uranium has been depressed for some time, much uranium has been sold to electric utilities from the mid-seventies right on through to today under long term contracts which provided large profit margins, believed to be more than sufficient to offset our fair share of the mill tailings cleanup costs.

We believe the federal government and the uranium producers should pay the lion's share of the costs of additional cleanup that may be warranted. We resist imposing yet another tax on uranium consumers.

Nevertheless, we are willing to work with this Committee and with the Congress to develop an equitable and fair solution to the mill tailings cleanup issue as a part of a comprehensive package.

With respect to uranium supply, we recognize it is in the long range interests of our consumers that we do have the security of a domestic supply available in case it should be needed. This means that some level of domestic uranium mining and milling capacity should be preserved.

Currently many of our companies have contracts with domestic suppliers who are not mining the uranium domestically, but are buying it overseas at lower cost than they can produce it in the U.S. in order to fill these domestic contracts with us.

In recent years, high grade uranium deposits have been discovered in Canada and Australia that can be recovered at very low cost. It is in the interest of the consumers of the United States that we do have full access to that low cost fuel.

To balance that near term consumer interest with the long term consumer interest in security of domestic supply, we would prefer to let market forces determine the domestic and foreign mix. We believe that under the free market conditions the domestic uranium industry will recover and will be able to provide a significant portion of domestic requirements.

However, should Congress desire to determine the domestic-foreign mix that we will use in our reactors, then it should do so in a way that will support the competitiveness of the electric consuming industries in the United States and not saddle them with higher energy costs.

One alternative that you might consider to imposing a numerical mix of domestic versus imported, the alternative would be to offer matching purchases of uranium from the huge U.S. stockpile to the U.S. producers of uranium mined and milled in this country.

This alternative would average down their costs, increase their profitability, and encourage domestic mining activities, while at the same time produce some revenue that would help with the federal deficit. Such an approach is far superior, we believe, to import restrictions, which would shift the burdens of preserving a domestic mining industry exclusively to today's electric consumers.

Please remember that we need to keep our electric customers competitive in this worldwide marketplace. Simply loading artificial cost burdens on utilities flies in the face of our worldwide competitiveness.

Finally, Mr. Chairman, we support your efforts to develop comprehensive legislation covering all of these nuclear fuel cycle issues. We pledge to work with you, and as we do so please bear in mind that there must come a time when we stop simply adding one more cost and barriers to nuclear generated electricity or we will hurt our customers' ability to compete in the world marketplace.

Thank you very much for this opportunity to share my views with you. I will be delighted to try to respond to questions, Mr. Chairman.

Senator **Ford**. Mr. Lee, before I get into some of the questions I had prepared to ask you, you gave a solution there as it related to the mix and taking some out of the inventory and would accelerate the use of our uranium mines.

How long, in your judgment, would that take us to get to that posture?

Mr. LEE. Well, I think——

Senator FORD. How much could you use? Clear me up on that a little bit. Just get into that in a little more detail. Educate me a little bit.

Mr. LEE. All right, sir. We are using right now about 40 million pounds of uranium per year in this country. We have—I am understanding we have 100 million or more in inventory.

If we took some of that, maybe eight million pounds a year, and matched that with eight being mined, or 16 million pounds a year, then we would have a reasonably strong mining and milling capacity of some eight million pounds a year, if we matched it from inventory. Or it could be larger.

Senator FORD. Under those circumstances, we could do that for approximately twelve years, could we not?

Mr. LEE. In that case, that would do it for about twelve years, yes, sir.

Senator FORD. A dozen years.

Mr. LEE. Yes, sir. And that would not cost the electric consumers any more and it would increase the federal revenues. And then we would see what the world market was like at that point.

Senator FORD. Your utility which you head has been pretty successful, as I said to you earlier, in nuclear power. You have several plants that were built within budget, on time, and operate both safely and economically, and you have one tremendous reputation.

I am glad you are here today with your testimony. Tell the rest of us how you account for the successes you have had, when other utilities have almost been ruined by their nuclear plants. Brag on yourself just a little bit here. We need that. Do not be bashful about it.

Mr. LEE. Thank you, Senator, for those kind words.

There are a number of utilities in this country that have been very successful in designing and building and operating these nuclear plants. The ones that get publicity are the ones that really have trouble. There are some that have fallen on their face.

The nuclear power industry—the nuclear power plants were a whole lot more complex than the utility industry anticipated they would be, and some companies were able to cope with that pace of change and some, frankly, were not able to cope with that pace of change.

There was also a changing licensing climate. There were a lot of midstream changes in regulations, where we had to tear out what we had built and put in something different as the rules of the game changed as we went along.

We had a mixed bag of success, some very successful and some not so successful, because our country has a heterogeneous electric industry. They are composed of a number of different entities, publicly owned, cooperatively owned, and investor owned.

Some of those succeeded with eminence and can compete with anybody in the world in the nuclear business, and some of those did not succeed, sir.

Senator **Ford**. You have been very good in the summation of your statement in answering the questions that I wanted to pose to you.

For instance, you are telling us that time is very short as it relates to your position as chief executive officer and the decision you must make, even though reluctant, you must make as it relates to your ratepayers and what you will have to do in your purchase of SWU's. The availability for that purchase is out there at a much lower price.

You headed a committee that came with some suggestions on how we could get around the governmental issue, I guess, of getting to or being able to move as a private industry could move as it relates to make decisions.

Let me ask you this. Is there enough excess enrichment capacity overseas to accommodate the needs of U.S. utilities?

Mr. **Lee**. There is currently an excess. They also can build new enrichment capacity within a time frame that is shorter than the period of cancellation of U.S. DOE contracts, such that new enrichment plants could be built either here or overseas.

Senator **Ford**. Within the term of the cancellation period?

Mr. **Lee**. Yes, sir.

Senator **Ford**. And am I correct that you gave me at least two countries that new discoveries have been made of easy to recover, probably so easy to recover that it would offset any kind of shipment costs, transportation costs?

Mr. **Lee**. Yes, sir, there are very rich ore bodies in Australia and Canada, richer than anything we have found in this country. And we would not want to deny access to that low cost uranium to our consumers.

Senator **Ford**. But would you want to buy from any particular country or is there any particular country you would not want to buy from?

Mr. **Lee**. Well, I think those two countries with those concentrated ore bodies are very eligible to supply our nation a portion of its requirements.

Senator **Ford**. I am talking about enrichment now.

Mr. **Lee**. I beg your pardon.

Senator **Ford**. I am sorry.

Mr. **Lee**. Well, I would prefer to buy our enrichment services in the United States. If it is not available on a competitive basis in the United States, then I would go elsewhere to some of our other nations.

There are two very viable enterprises in Europe now that are providing enrichment services. One is in France and the other is a consortium of U.K., Belgium, and—excuse me, U.K., West Germany, and The Netherlands.

Senator **Ford**. Is my concern valid as it relates to, we have a little more interest here than just trying to keep the industry competitive, that we do have a national security interest?

Mr. **Lee**. Yes, sir, and I think that is all the more reason we should make sure that the DOE enrichment enterprise survives and survives competitively. But it is going to go down the tube unless we move fast.

Senator **Ford**. All right. I agree with you, and I am anxious to—maybe I am more sensitive to the issue since I have a parochial interest here. But nevertheless, I do understand it from that perspective.

Mr. **Lee**. Senator, I think your parochial interest and the national interest coincide on this point, sir.

Senator **Ford**. Well, I lucked out, did I not?

Mr. **Lee**. Yes, sir.

Senator **Ford**. Mr. Lee, let me—we have a controversy and you have heard it today. And can you give me your view of the controversy that has arisen between OMB and GAO and DOE over the so-called enrichment program debt? You I am sure studied that in that group that you headed, and if you could elaborate on that for the Committee, please, sir.

Mr. **Lee**. Yes, sir. I would agree with Senator Evans a little earlier this morning. If you allocate depreciation and interest costs to the military enrichment of uranium that has gone on since those plants were built and say those costs were incurred as a part of the defense of our nation, then you will find that the civilian sector has provided more revenues than the remaining total costs cumulatively over all the years of those plants.

And therefore, with that allocation to the military, there are no remaining costs allocable to the civilian sector and we do not owe another dime.

But naturally, in their zeal for revenue and trying to reduce the federal deficit, OMB seeks to get the utilities to pay more than that. They simply do not ascribe any depreciation or interest to the military program up through about 1981 or '2. And we do not think that is equitable or fair. That should properly have been allocable to the military program.

All taxpayers should pay for national defense and security, sir, and not just electric consumers.

Senator **Ford**. Then you are saying that we do not need even to allocate to the costs the $350 million that we find laying out there?

Mr. **Lee**. I will acquiesce to the $350 million to settle the issue, sir, but I think rigorous arithmetic would show it is zero or negative.

Senator **Ford**. It is kind of like my uncle told me when I was trying to sell his cow. He said: She kicks, son; but if they do not ask you, do not tell them. Let us take the $350 million and get out of this squabble, that is what you are saying to me.

Mr. **Lee**. Yes, sir. And let us do something on that quickly or we are going to start having to make contracts on behalf of our consumers at much lower prices.

Senator **Ford**. Now, Mr. Lee, let me get to one other. You are in the utility business.

Mr. **Lee**. Yes, sir.

Senator **Ford**. Your reputation is there for everyone to see. We have a quasi-government entity, I guess, in TVA, and then we have the uranium enrichment program, and we have a take or pay contract. And that take or pay contract really puts a load based on what the cost per SWU's ultimately result in.

Can you tell me, are both sides right? How do we get out of this one? If you do not want to answer, I will not expect you to. If you want to think about it a little bit and send me a written answer as to your feelings about it, I will be glad to accept that. If you want to lay it out here today, that suits me fine.

I do not know how to settle that controversy, and what I am afraid of, in our interest of trying to work it out, that we might make the wrong decision. And I want to go full steam ahead, but I do not want to overrun the rabbit.

Mr. LEE. I understand, sir. None of us are privy to those who negotiated the contract in the first place, and I do not want to practice law without a license by trying to interpret the contract.

But as I heard the discussion this morning, TVA does set rates unilaterally based upon their concept of what they call prevailing rates. I do not know how they allocate their costs among their retail and commercial and industrial customers.

But I do know that the rate that results in $12 and something per kilowatt month for a demand charge are substantially higher than rates for demand charges from other utilities in the region of the Southeast. In our own case, if we had 4,485 megawatts of demand—and we do not have any customer anywhere near that large, so I do not know whether our existing industrial rates would apply or whether there would be some further discount.

But if you just take the existing Duke Power Company rate structure, that annual charge for that much demand with no energy associated with it would be $370 million, not $510 million or $550 million. So at least in our case, we would be substantially anywhere from $140 million to $180 million a year less than TVA.

And that is significant. $180 million and 12 million SWU's, that is $15 per SWU and that is very significant in the worldwide marketplace.

Now, we interchange some power through some others with TVA every now and then, and we respect those people. But I will tell you this: If that is indicative of their current rates to their industry, we would be glad to steal their customers. [Laughter.]

Senator FORD. And you do not have the ability to set your own rates as such, do you?

Mr. LEE. No, sir.

Senator FORD. As they do.

One final question. I have some other things—you are tickling my appetite—to be included, Mr. Lee. There has been a great deal of discussion today on the AVLIS technology. We would like to know if you view, as we do, that the AVLIS technology is a necessary ingredient for DOE to remain competitive in the world market?

Mr. LEE. Yes, sir, it is. I think they selected the right technology for the future when they selected AVLIS. I think it would be disastrous if our R&D budget went to zero three years hence in AVLIS. And on behalf of our consumers, to raise $80 million a year to support AVLIS, I think it would be highly justified for us to pay between six and seven dollars per SWU to support the AVLIS program.

And if you set this thing up as a separate quasi-government corporation where they could take in their revenues and pay all their costs, including R&D, and not have to rely on you for appropriations, I think that is the best thing to do and the consumers of this country would be well served by funding that $80 million or so a year, and let us go and bring AVLIS in so we can deploy it when these enrichment plants ultimately wear out.

We might even put some of them in Portsmouth—I mean in Paducah.

Senator **Ford**. I am glad you caught yourself, Mr. Lee. [Laughter.]

I enjoy you and I am reluctant to turn you loose as a witness. But I do appreciate you being here today and I appreciate your attitude. And let me tell you, I am going to be calling on you and we are going to be talking man to man and see what I can glean from you to help me as I try to walk through this minefield and get to the final answer.

And I do appreciate you very much, Mr. Lee.

Mr. **Lee**. Thank you, Senator.

Senator **Ford**. We have the final witness for today is J.D. Stephens, President of Local 3-288 Oak Ridge, Tennessee, the Oil, Chemical & Atomic Workers of America. He will be accompanied by: Nolan Hancock from the Washington OCAW; and my constituent Steve Courtney from Paducah OCAW.

Mr. Stephens, are the others going to make statements also?

Mr. **Stephens**. No, just answer questions.

Senator **Ford**. You may proceed. You can submit for the record and summarize, do whatever you want to.

STATEMENT OF J.D. STEPHENS, PRESIDENT, LOCAL 3-288, OIL, CHEMICAL & ATOMIC WORKERS OF AMERICA, OAK RIDGE, TN, ACCOMPANIED BY NOLAN HANCOCK, WASHINGTON OFFICE, OCAWA; STEVE COURTNEY, PADUCAH LOCAL, OCAWA; AND JOHN WILLIAMS, COORDINATOR FOR NUCLEAR GROUPS, OCAWA

Mr. **Stephens**. I will be a little redundant, I guess.

Senator **Ford**. Wait just a minute. Usually the crowd goes with everybody that is here, and whatever is back behind you is your crowd.

Thank you very much. Go ahead.

Mr. **Stephens**. I guess I will be a little repetitious and redundant today, since we go on last. That is the hazard, I guess, sometimes of going on last.

Senator **Ford**. Well, you do whatever you want to.

Mr. **Stephens**. Thank you.

Senator **Ford**. I think everybody understands where one of these plants are.

Mr. **Stephens**. It is a pleasure to appear before this Committee today and discuss some observations and concerns which we have about the United States uranium enrichment program. This is a very important program to our country, but it is troubled today by problems of instability and inconsistent direction.

We believe an immediate start toward a permanent solution to these problems is of national importance. The uranium enrichment business is a big business. In the free world sales amount to $2.5 billion annually. Having lost its monopoly over the last decade, the

United States still enjoys about a 50 percent market share, which represents an important source of income for the country.

Furthermore, almost $500 million per year of our revenues represents payments from non-U.S. utilities and therefore is helpful in mitigating our serious balance of trade problems.

Of even more importance than the economic benefits, however, are the security benefits associated with a healthy U.S. enrichment business. Our nuclear Navy, as well as other defense programs currently under consideration, depend upon material from our enrichment plants.

In addition, 15 percent of the electricity generated in the United States today comes from nuclear fuel which has been enriched in the United States.

Many experts who fear another oil crisis in the 1990's believe that nuclear energy may ultimately provide a larger fraction of our country's electricity needs and are concerned that we are on a course that will compound our dependency upon foreign sources of oil with an unnecessarily additional dependency on foreign sources of uranium enrichment services.

Thus, we firmly believe that the uranium enrichment program is important for national and energy security, as well as being an important source of revenue for the U.S. treasury and a direct source of jobs for 6,000 American workers.

A number of the problems in the enrichment program arise from the fact that the enrichment business is highly competitive today. Therefore, success in achieving our country's various goals for uranium enrichment, such as national security, energy security, jobs, and balance of trade, is dependent on the operation of the U.S. enrichment program as a healthy commercial entity.

Today there is fierce international competition in the uranium enrichment business. Our primary competition comes from government-backed enrichment programs in Europe and in Russia. The Europeans for the last several years have made a determined effort to penetrate DOE's business base and other market sectors, and their success is obvious from our own plummeting market share.

In fact, today even some U.S. utilities are buying their fuel from European enrichers. What is even more disturbing, if they are true, are current trade journal reports of deals which will effectively result in Russian enriched uranium being used by some U.S. utilities.

The trade press reports which have mentioned these impending deals claim that they involve clever swaps of material through German companies, assisted by brokers. That is, the transactions purportedly involve European utilities who are buying Russian enrichment and the selling a comparable amount of U.S. or European enriched uranium back to the U.S. utilities.

We do not believe U.S. utilities should be permitted to use Russian enrichment services, even if the transactions are laundered and indirect.

As we read about the future for the enrichment business, we do not see any letup in the competitive pressures. We certainly expect the Europeans to continue to be tough competitors as a result of technology and manufacturing improvements and retirement of facility indebtedness. In addition, the Japanese, who are among our very best customers, could well enter the commercial market during the 1990's.

During that same period, our own cost base could begin to erode. This could happen if sudden increases in our electricity rates should occur at the gaseous diffusion plants and are not mitigated by preserving flexibility in our gaseous diffusion plant production capabilities and by demonstrations of advanced technology.

As you can see, we see an enrichment business that is highly competitive today and promises to remain so for the duration. We are not afraid of competition and believe that there is a reservoir of strength in our program that can be tapped to ensure our success, given a fighting chance.

However, we are concerned at current United States actions in the face of the competition I just described. Here I think it is important to look now not at what people are saying about the enrichment business, uranium enrichment, but to look at what is actually happening.

We seem to be in effect exiting the enrichment business. The Administration is reportedly trying to establish a token symbol of privatization and a climate of instability has been created. Our observation, therefore, is that today's actions in our enrichment program are tantamount to exiting the enrichment business and are creating a climate of instability.

If this is not checked, it will be very difficult for any entity to recover the business and put it on a healthy footing. We would like to recommend for your consideration some thoughts which we believe might be helpful in correcting the problems which the United States uranium enrichment program faces today.

The establishment of a government corporation for enrichment. We believe that a government corporation for enrichment is the appropriate vehicle for ensuring that the various short term and long term interests and the various commercial and security interests are properly balanced in the overall total national interest.

We also believe a government corporation would be a mechanism for clarifying once and for all the charter and statement of mission and purpose which Congress expects from the enrichment program.

The TVA demand charge. This issue seems to be—seems to us to be basically a contract dispute. Nevertheless, failure to resolve it is creating considerable uncertainty regarding DOE's liabilities and therefore the price of its enrichment services.

We think the TVA demand charges should be immediately submitted to arbitration or even litigation if DOE and TVA continue to be unable to constructively negotiate a settlement.

Treasury repayment. To us it seems that the idea of repayments to the treasury has been fallaciously presented. If the stockholders of the enrichment business, i.e., the U.S. taxpayers, are entitled to payments, it seems that the concept for those payments should be analogous to dividend payments based on the profitability of the business.

Gaseous diffusion plants. Given the uncertainties about future production levels, introduction of advanced technology into the marketplace, and future prices of electric energy at three gaseous diffusion plants, it seems prudent to preserve maximum flexibility to operate at the overall lowest possible cost by maintaining the capability to operate all three gaseous diffusion plants.

We would recommend such a posture for the next few years, until the advanced technology demonstrations are concluded and factors which might impact the electricity costs, such as environmental legislation and higher oil prices, are better known.

Advanced technology. We believe that any commitment to the long term health of the uranium enrichment business requires a determined effort to demonstrate and ultimately deploy advanced uranium enrichment technology. We understand that AVLIS is doing very well in the laboratory and are encouraged by its potential.

Cooperation with the U.S. mining community. Since the DOE enrichment business itself possesses a large stockpile of natural uranium, it appears that there might well be ways the enrichment business and the mining industry could cooperate to enhance the sales of both products and thereby reverse the current situation whereby the two parties are so polarized.

We believe that creative uses of the DOE stockpile, SWU discounts for customers providing U.S.-origin feed, and other similar ideas could add value to DOE's enrichment assets, stimulate the domestic mining business, and provide utilities with a good deal.

We recognize that we do not have the detailed knowledge of the business which DOE possesses and that these recommendations may be deficient in detail. They are offered in a constructive spirit and we hope they provide some stimulus for further review and action.

We noted at the beginning of this statement that the uranium enrichment business is a very important one for our country. At least that is our view as the workers in the business. We are somewhat dismayed, however, by several ironies which we find in today's situation.

First of all, as people talk about the numerous problems which the business is facing today, there may be a tendency to think the problems are too numerous and too complex for resolution. We strongly disagree with this assessment and urge that all parties to this issue avoid a defeatist attitude.

We have confidence that a focused management of the type we recommend in the government corporation can tackle the problems.

Second, we are troubled that a White House official with apparent influence in the privatization issue has written that one reason why privatization is better than the government corporation is because labor unions under a government corporation clamor for higher wages, better working conditions, and more job security.

This statement does more than illustrate an ignorance of enrichment economics. We find this to be a particularly uninformed and undeserved insult to the workers in the understand enrichment business. Nowhere will you find anyone with real knowledge of the business who lists labor costs or inefficiency as one of the problems facing the U.S. enrichment business today.

To the contrary, the enrichment plants have been among the nation's leaders in cost effective production. Year after year, DOE has been able to hold the line on gaseous diffusion plant budgets because of the productivity improvements the gaseous diffusion team has achieved. DOE has even cited our numerous accomplishments as being of vital importance in allowing the price reductions which have been essential in permitting DOE to move toward a competitive price zone.

The U.S. enrichment business can pay its own way. We want no handouts. We also do not need gratuitous remarks from people who only theorize about the business, rather than earn their living in it.

We can offer predictable competitive prices and exceptionally good service to our many utility customers around the world. We can operate the plants cost efficiently year after year. And we can bring new technology along to assure the long term health of the business.

All of these things are possible, but stability is a prerequisite to remove the program from the center of all the conflicting political agendas presently ensnaring it. We believe the government corporation which we are recommending is the right mechanism for achieving this needed stability and providing the framework within which the serious and widely recognized business problems can be resolved in a fair, businesslike way.

Mr. Chairman, uranium enrichment is American made. The whole business was born here. Even today, we have the largest slice of the market, the best workers, the best plants, and the best advanced technology in the world. These are powerful assets.

We need no false supports, subsidies or barriers. We urge the Congress' consideration of this accountable government enrichment entity so that this business, so vital to our security, trade and competition, is not wasted away. We feel these problems are urgent enough that we would ask the Congress to take action on our recommendations some time this year.

Thank you very much.

[The prepared statement of Mr. Stephens follows:]

STATEMENT OF
J. D. STEPHENS
PRESIDENT, LOCAL 3-288
OIL, CHEMICAL AND ATOMIC WORKERS
BEFORE THE COMMITTEE ON ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
MARCH 13, 1987

INTRODUCTION

Thank you Mr. Chairman. It is a pleasure to appear before this Committee today and discuss some observations and concerns which we have about the United States uranium enrichment program. This is a very important program to our country, but it is troubled today by problems of instability and inconsistent direction. We believe an immediate start toward a permanent solution of these problems is of national importance.

The uranium enrichment business is a big business. In the free world, sales amount to $2.5 billion annually. Having lost its monopoly over the last decade, the United States still enjoys about a 50% market share, which represents an important source of income for the country. Furthermore, almost $500 million dollars per year of our revenues represents payments from non-U.S. utilities and therefore is helpful in mitigating our serious balance-of-trade problem.

Of even more importance than the economic benefits, however, are the security benefits associated with a healthy U.S. enrichment business. Our nuclear navy as well as other defense programs currently under consideration depend upon material from our enrichment plants. In addition, 15% of the electricity generated in the United States today comes from nuclear fuel which is enriched in the United States. Many experts who fear another oil crisis in the 1990s believe that nuclear energy may ultimately provide a larger fraction of our country's electricity needs and are concerned that we are on a course that will compound our dependency upon foreign sources of oil with an unnecessary additional dependency on foreign sources of uranium enrichment services.

Thus we firmly believe that the uranium enrichment program is important for national and energy security as well as being an important source of revenue for the U.S. treasury and a direct source of jobs for 6,000 American workers.

STATUS OF THE URANIUM ENRICHMENT PROGRAM

A number of the problems in the uranium enrichment program arise from the fact that the enrichment business is highly competitive today. Therefore, success in achieving our country's various goals for uranium enrichment, such as national security, energy security, jobs, and balance of trade, is dependent on operation of the U.S. enrichment program as a healthy commercial entity.

Today, there is fierce international competition in the uranium enrichment business. Our primary competition comes from government-backed enrichment programs in Europe and in Russia. The Europeans, for the last several years, have made determined efforts to penetrate DOE's business base in all market sectors, and their success is obvious from our own plummeting market share. In fact, today even some U.S. utilities are buying their fuel from European enrichers. What's even more disturbing--if they are true--are current trade journal reports of deals which will effectively result in Russian-enriched uranium being used by some U.S. utilities. The trade press reports which have mentioned these impending deals claim that they involve clever swaps of material through German companies, assisted by brokers. That is, the transactions reportedly involve European utilities who are buying Russian enrichment and then selling a comparable amount of U.S.- or European-enriched uranium back to U.S. utilities. We do not believe U.S. utilities should be permitted to use Russian enrichment services, even if the transactions are laundered and indirect.

As we read about the future for the uranium enrichment business, we don't see any letup in the competitive pressures. We certainly expect the Europeans to continue to be tough competitors as a result of technology and manufacturing improvements and retirement of facility indebtedness. In addition, the Japanese, who are among our very best customers, could well enter the commercial market during the 1990s. During that same period, our own cost base could begin to erode. This could happen if sudden increases in our electricity rates should occur at the gaseous diffusion plants and are not mitigated by preserving flexibility in our gaseous diffusion plant production capabilities and by demonstration of advanced technology.

As you can see, we see an enrichment business that is highly competitive today and promises to remain so for the duration. We are not afraid of competition and believe that there is a reservoir of strength in our program that can be tapped to ensure our success, given a fighting chance.

However, we are concerned about current United States actions in the face of the competition I just described. Here I think it is important to look not at what people are saying about uranium enrichment, but to look at what is actually happening:

1. We seem to be, in effect, exiting the enrichment business.

   We believe that such an observation is warranted by the way the enrichment program is currently proceeding. For example, it has been proposed that the advanced technology effort be stopped; the enrichment plants are being operated at low production levels and inventories are being sold off at an accelerated pace; and large portions of the sales revenues received from the utility customers are earmarked for the U.S. treasury. This flow of money from the customers to the treasury is via both the so-called "repayments to treasury of the unrecovered government investment in enrichment," and through uncapped payments to the Tennessee Valley Authority for power which is not being used. Again, we conclude that these actions appear to be those of a company that is liquidating its assets and going out of the business.

2. The Administration is reportedly trying to establish a token symbol of privatization.

   For many years, the issue of privatization of the uranium enrichment business has appeared on the scene from time to time. Privatization has always failed, largely because of associated give-aways and subsidies and because of Congressional concern that the broad missions for the enrichment program, which are of a long-term national interest nature, could not be best protected within a purely commercial framework. Nevertheless, today we read that DOE is under pressure to set up in the business one small company who has offered to take over some of DOE's business for it. We are not familiar with the details of the particular privatization initiative that the Administration is currently trying to implement. However, it seems to us that there is the possibility of give-away of government facilities, guarantees, subsidies, and damage to the remainder of DOE's operations at Paducah and Portsmouth caused by skimming off production. These concerns argue, we believe, for very close investigation of this fragmentation effort. We do not believe that piecemeal privatization propped up by subsidies is in the country's interest.

3. A climate of instability has been created.

   We give the DOE enrichment program great credit for launching a recovery effort in 1984 which was aimed at reversing the precipitous market losses of the previous decade. We also, by the way, appreciate the manner in which DOE kept the workers at its enrichment plants informed about the recovery program. In 1984, and again in 1985 and 1986, DOE went forward to its utility customers throughout the world with contracts and offers which were much more flexible and more competitive than those of the past. These initiatives met with considerable success, and market share was stabilized for the near term. An integral part of the marketing and sales effort was a promise of stability and competitiveness achieved through near-term cost reductions and long-term introduction of more cost-effective advanced technology. In 1985, the Atomic Vapor Laser Isotope Separation process (AVLIS) was then selected as the U.S. technology of the future and other program costs were cut dramatically. The customers saw decisive actions in 1985 which went with the words of the sales team.

Then, in 1986, on the heels of this successful sales campaign were delivered some major blows to the program's credibility. First of all, the underpinning of the long-term competitiveness of the business, i.e., the advanced technology program, was knocked out when AVLIS was marked for termination. Second, the promise of competitive near-term prices was shaken when an additional cost factor to be imposed on customers of U.S. enrichment services was established. This cost factor, the "treasury repayments on unrecovered government investment," which I mentioned a moment ago, represents a major uncertainty for everyone who buys uranium enrichment from the United States. DOE's customers, of course, believe that this is flawed economics since they have already paid for most of the enrichment program's investments through the revenues they have provided DOE. In any case, this issue, which is currently unresolved, imposes a 25% uncertainty on the long-term price of separative work from U.S. enrichment plants. The DOE's business probably cannot survive either an arbitrarily high cost burden of this magnitude or the continued uncertainty in resolving what the figure really is. It's difficult to make a long-term sale if you can't project a competitive price.

In addition, the previous year has seen other events, such as the continued media feud between TVA and DOE and the privatization initiative, which have eroded customer confidence in predictable policies and stable prices from DOE.

Our observation therefore is that today's actions in our enrichment program are tantamount to exiting the enrichment business and are creating a climate of instability. If this is not checked, it will be very difficult for any entity to recover the business and put it on a healthy footing.

RECOMMENDATIONS

We would like to recommend for your consideration some thoughts which we believe might be helpful in correcting a number of the problems which the United States uranium enrichment program faces today:

1. Establish a government corporation for enrichment:

   We believe that a government corporation for enrichment is the appropriate vehicle for ensuring that the various short-term and long-term interests and the various commercial and security interests are properly balanced in the overall national interest. We also believe that a government corporation would be a mechanism for clarifying once and for all the charter and statement of mission and purpose which Congress expects for the enrichment program. We think this will, among other things, establish an accountable enrichment entity and measures by which the Congress can judge the performance of that entity. The major product of this action would be much-needed stability. In addition, a government corporation could operate with a set of books and regulations which enhance its ability to operate in a more commercial nature than is presently possible. Timely response in the marketplace and more efficient use of revenues are but two examples of these advantages.

2. Take a businesslike approach to solution of current problems.

   It seems to us that a number of today's specific enrichment program problems are of the type which should be subjected to rational business analysis:

   A. TVA demand charge. This issue seems to us to be basically a contract dispute. Nevertheless, failure to resolve it is creating considerable uncertainty regarding DOE's liabilities and therefore the prices of its enrichment services. We think the TVA demand charge issue should be immediately submitted to arbitration or even litigation if DOE and TVA continue to be unable to constructively negotiate a settlement.

   B. Treasury repayment. To us, it seems that the whole idea of repayments to treasury has been fallaciously presented. If the stockholders of the enrichment business, i.e., the U.S. taxpayers, are entitled to payments, it seems that the concept for those payments should be analogous to dividend payments based on the profitability of the business. Again, we believe this is a process which is familiar to the business community and which would lead toward establishing a fair "value" for the enrichment entity and a fair mechanism for ensuring that the U.S. taxpayers' long-term interests were represented. We think the taxpayer will ultimately benefit more from a healthy enrichment business than from short-term cash generated by liquidating the assets.

   C. Gaseous diffusion plants. Given the uncertainties about future production levels, introduction of advanced technology into the marketplace and future prices of electric energy at the three gaseous diffusion plants, it seems prudent to preserve maximum flexibility to operate at the overall lowest possible cost by maintaining the capability to operate all three gaseous diffusion plants. We would recommend such a posture for the next few years until the advanced technology demonstrations are concluded and factors which might impact electricity costs, such as environmental legislation and higher oil prices, are better known.

D. Advanced technology. We believe that any commitment to the long-term health of the uranium enrichment business requires a determined effort to demonstrate and ultimately deploy advanced uranium enrichment technology. We understand that AVLIS is doing very well in the laboratory and are encouraged by its potential.

E. Cooperation with the U.S. mining community. Since the DOE enrichment business itself possesses a large stockpile of natural uranium, it appears that there might well be ways the enrichment business and the mining industry could cooperate to enhance the sales of both products and thereby reverse the current situation wherein the two parties are so polarized. We believe that creative uses of the DOE stockpile, SWU discounts for customers providing U.S. origin feed, and other similar ideas could add value to DOE's enrichment assets, stimulate the domestic mining business, and provide utilities with a good deal.

We recognize that we do not have the detailed knowledge of the business which DOE possesses and that these recommendations may be deficient in detail. They are offered in a constructive spirit and we hope they provide some stimulus for further review and action.

CONCLUSIONS

We noted at the beginning of this statement that the uranium enrichment business is a very important one for the country. At least that is our view as the workers in this business. We are somewhat dismayed, however, by several ironies which we find in today's situation. First of all, as people talk about the numerous problems which the business is facing today, there may be a tendency to think the problems are too numerous and too complex for resolution. We strongly disagree with this assessment and urge that all parties to this issue avoid a defeatist attitude. We have confidence that a focused management of the type we recommend in a government corporation can tackle the problems.

Secondly, we are troubled that a White House official with apparent influence in the privatization issue has written that one reason why privatization is better than a government corporation is because "Labor unions [under a government corporation] clamor for higher wages, better working conditions, and more job security." This statement does more than illustrate an ignorance of enrichment economics. We find this to be a particularly uninformed and undeserved insult to the workers in the United States enrichment business. Nowhere will you find anyone with real knowledge of the buiness who lists labor costs or inefficiencies as one of the problems facing the U.S. enrichment business today. To the contrary, the enrichment plants have been among the nation's leaders in cost-effective production. Year after year, DOE has been able to hold the line on gaseous diffusion plant budgets because of the productivity improvements the gaseous diffusion team has achieved. DOE has even cited our numerous accomplishments as being of vital importance in allowing the price reductions which have been essential in permitting DOE to move toward a competitive price zone.

The U.S. enrichment business can pay its own way. We want no handouts. We also don't need gratuitous remarks from people who only theorize about the business rather than earn their living in it. We can offer predictable, competitive prices and exceptionally good service to our many utility customers around the world. We can operate the plants cost efficiently year after year. And we can bring new technology along to secure the long-term health of the business. All of these things are possible, but stability is a prerequisite to remove the program from the center of all the conflicting political agendas presently ensnaring it. We believe the government corporation which we are recommending is the right mechanism for achieving this needed stability and providing a framework within which the serious and widely-recognized business problems can be resolved in a fair businesslike way.

Mr. Chairman, uranium enrichment is American made. The whole business was born here. Even today, we have the largest slice of the market, the best workers, the best plants, and the best advanced technology in the world. These are powerful assets. We need no false supports, subsidies, or barriers. We urge the Congress' consideration of an accountable government enrichment entity so that this business, so vital to our security, trade, and competition, isn't wasted away.

Thank you very much for giving me the opportunity to appear before this Committee today.

Senator FORD. Thank you very much, Mr. Stephens. That is a very good statement and I compliment you and Steve's group for the contribution they have made for the efficiency and ability to produce.

I think we have learned here today in our testimony, it is not the factory cost that is creating the problem for us. The workers are doing their job above and beyond. But it is outside costs that you have no control over that delves into the public entity, which ultimately winds up here. I would like to keep it here, but I think maybe we are moving in a direction that we need to do something else.

Having said that, Mr. Stephens, are you aware of foreign SWU's being sold in this country?

Mr. STEPHENS. Yes, sir.

Senator FORD. If so, can you elaborate on that and give specifics as to what their sources and prices?

Mr. STEPHENS. Prices I cannot. I do not have that with me.

Senator FORD. You can maybe give me a ballpark figure. But give me specifics as to the sources.

Mr. STEPHENS. Urenco and the two European consortiums that were referred to in the last testimony. I think Urenco and Eurodif are the corporations.

We are also concerned about the Russians. About two years ago, we found out two U.S. utilities were buying Russian SWU's, and by contacting the board chairmen and the presidents of those companies we managed to get that stopped.

They were in the process of negotiating a contract with an outfit called SWUCO, who is a broker for the Russians, to sell Russian SWU's here. We did manage to get that stopped, but I found out a couple of weeks ago that now they are going in the back door and trying to do the same thing. And what they are doing is bringing the Russian uranium, enriched uranium, into Europe and changing flags and sending it back to the United States. And they are getting ready to sign a contract, I think, this month on that. We are really concerned about that.

Senator FORD. Could we discuss that a little later, and bring that to my attention.

I raised the flag and everybody kind of came down on me pretty hard, Steve will tell you, a year ago or better. And SWUCO and American Enrichment, Incorporated, wanted to get to Portsmouth, and others, and we began to trace those who were representing SWUCO and the Russian entity over here. And the protocols that had been signed and all that begins to show some things that stir a little bit.

Maybe what I said then is I was beginning to say I told you so. We need to watch that very closely and I think that is very important to us.

How do you and your workers look to this uranium enrichment enterprise as being important to our national security? Have you made a judgment on that yet and have you moved in that direction and come with the position of your people?

Mr. STEPHENS. It is very important to the national security, not only with the nuclear Navy but also with the dependence on foreign countries for our electricity ultimately. So we are looking at that.

Senator **Ford**. On these utilities that were using Russian SWU's, I want that for the record. I will ask you to give that to me and we will go from there.

I think you have made a judgment now as to the direction this enterprise should go as it relates to the controlling entity. Would you give me that again so that we can be specific as it relates to your recommendation, whether it is privatization or government, quasi-government agency, and that sort of thing?

And I agree with you that some fellow up there in the White House—I think he was fired after he said it—wanted to give the whole enterprise away if somebody would just take it.

But nevertheless, give me your preference between the government corporation you advocate in your testimony and outright privatization or sale of the entire industry?

Mr. **Stephens**. First of all, we do feel DOE is trying to exit the business, exit the uranium enrichment business.

Senator **Ford**. There are some in OMB would also like to do that. I am not sure it is the overall intention of DOE to get rid of it.

Mr. **Stephens**. Well, it is being pushed by the Administration.

Senator **Ford**. You got it.

Mr. **Stephens**. But going the direction we are going now with DOE—and they have made some strides. They have done some things in their sales contracts that have improved. But one problem, as I see it, is DOE is not allowed to promote its own industry.

And you know, there are a lot of anti-nukes out there who would like to see the whole business gone. And I do not know if it is an Administration problem that they cannot promote their own industry or what it is. But we feel like in order to stay in business and stay competitive we need to do that first.

France is doing it. France has been real competitive with it and done a lot of strides in their sales that way.

Given the direction DOE is going now, we feel like the government-owned entity is the way to go, unless we can change the direction.

Senator **Ford**. It is going to be difficult, and I think Mr. Lee, who has a reputation of getting things done, headed the commission a couple of years ago and gave some recommendations at that time which basically are what we are looking at now.

And I think we have our work cut out for us, however. But I think it is a victory that can be won, not only for the utility interests in this country but for the security of the future.

And I want to thank you again for your excellent statement. And Steve, I am glad to see you here, and we look forward to working with you and maybe even visiting with you some time down in God's country. Thank you all very much for coming today.

This hearing is adjourned.

[Whereupon, at 12:20 p.m., the hearing was adjourned.]

APPENDIXES

Appendix I

Responses to Additional Committee Questions From the March 9, 1987, Hearing

Department of Energy
Washington, DC 20585

May 1, 1987

Honorable Wendell H. Ford
Chairman
Subcommittee on Energy Research and
 Development
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

On March 9, 1987, A. David Rossin, Assistant Secretary for Nuclear Energy, and Helmut A. Merklein, Administrator of the Energy Information Administration appeared before the Subcommittee on Energy Research and Development of the Committee on Energy and Natural Resources to discuss the domestic uranium mining industry and uranium mill tailings.

Following the hearing, you submitted written questions for our response to supplement the record. Enclosed are the answers to those questions, which also have been sent directly to the Committee staff.

If you have any questions, please have your staff call Mike Gilmore or Tom Todd on 586-4277. They will be happy to assist you.

Sincerely,

Thomas Todd
for Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosures

FOLLOWUP QUESTIONS
HEARING ON URANIUM MINING AND MILL TAILINGS RECLAMATION

March 9, 1987

QUESTIONS FOR EIA
FROM SENATOR WENDELL FORD

1. Please describe the supply and demand for uranium. Please provide current data and your best guess for the 1990's. Specifically, what are current utility requirements for uranium and what will future requirements be?

2. Where will the supply come from -- production? -- imports? -- inventory?

3. What is the status of U.S. utilities commitments for foreign source uranium? How much is being imported, and from where?

4. What are current prices for domestic uranium? What are current prices for imported uranium?

5. What prices are needed for U.S. producers in order for the domestic uranium indusrtry to be viable?

6. What prices are projected for the 1990's? How do these prices differ from current prices and what factors does EIA think caused this difference?

7. Please provide information on your best estimates of reclamation costs for cleaning up mill tailings at UMTRCA Title II sites? Please include the amount that you believe the uranium industry has set aside to pay these cleanup costs.

8. What is your estimate of the cost per ton of reclamation of mill tailings from the Title II sites?

Follow-Up Questions Submitted to Department of Energy/Energy Information Administration

(From Senator Domenici)

Hearing of March 9

1. In view of EIA's finding of "nonviability" of the uranium industry for the second year in a row, does DOE plan to continue the remedies it put in place last year, with respect to free variable tails assay options and curtailing drawdown of the stockpile? Why or why not? Will you request that the U.S. Trade Representative take any action? Why or why not?

2. In the 1984 viability assessment, DOE's estimate of percent imports (as reported to USTR Clayton Yeutter) was 37.4% (suspiciously close to the 37.5% trigger point in 170B of the AEA). Yet, on page 81 of the 1985 viability study, that estimate for 1984 is shown as 39.2%. Which number is correct? Assuming that your 1985 percentage is also subject to revision when you do your 1986 study, it could also easily exceed the 37.5% trigger point, in which case we would end up with two consecutive years at greater than 37.5% imports. Do you consider this a plausible scenario? What actual percentages will you use with reference to the 170B requirements? (I would hope you would use the most up-to-date and accurate ones).

3. I'd like to quote a few excerpts from a paper written by a Canadian author from a Canadian perspective, concerning Canadian uranium exports to the U.S.:

   (Reference: David Haglund, "Protectionism and National Security: The Case of Canadian Uranium Exports to the U.S.")

   - "It is no secret that Canadian uranium is selling in the United States at prices lower -- often far lower -- than the price Canadian uranium sells for at home."

   - "The Saskatchewan producers ... sell in the foreign market, at prices lower, to be sure, than those that Ontario producers are fortunate to command from Canadian consumers."

   - "Ontario Hydro (a major Canadian nuclear utility) is paying its long-term (uranium) suppliers what amounts to a premium of more than 100 per cent."

   - "... Canada forces its uranium mills to ship their U308 to Ontario's conversion facility (for conversion to UF6 prior to export), thus ... limiting the amount of business available to the two American conversion operations run by Allied Chemical and Kerr-McGee."

Here we have a Canadian author, who basically believes that Canada's trade practices are "fair", and yet he himself admits that their market is skewed. How can our own U.S. Trade Representative refuse to look into a siutation that even the Canadians admit is an unlevel playing field?

4. If "free trade" between the U.S. and Canada is considered so important to this Administration, why isn't the Administration objecting to the Canadian requirement that all Canadian uranium for export must first be converted to UF6 at Canadian conversion plants prior to export?

5. The Canadian export policy, with respect to uranium, is designed to maintain a stable market by assuring adequate supplies for domestic and international needs (see last year's hearing record, S.Hrg. 99-673, page 213). To this end, Canada sees to it that 30 years of fueling requirements are met for their own domestic use. All export contracts are required to contain floor prices, or a "similar mechanism" which protect investment and employment in their uranium production facilities.

   a) Do our U.S. export contracts contain similar provisions? If not, would adoption of such provisions improve our competitive position with respect to the international market?

   b) Do you have any details about what Canada's floor prices or "similar mechanisms" are? If not, why isn't the U.S. Trade Representative investigating this in more detail?

FOLLOWUP QUESTIONS
HEARING ON URANIUM MINING AND MILL TAILINGS RECLAMATION

March 9, 1987

QUESTIONS FROM SENATOR FORD

Q1: Please describe the supply and demand for uranium. Please provide current data and your best guess for the 1990's. Specifically, what are current utility requirements for uranium and what will future requirements be?

A: U.S. utilities reported (Uranium Industry Annual Survey (1985)) that they would require 32.3 million pounds of uranium oxide (U_3O_8) for delivery to domestic and foreign enrichment suppliers in 1986 and 33.9 million pounds U_3O_8 in 1987. Annual uranium requirements are projected to be in the 35-million-pound range during the rest of the century. Total cumulative requirements for the 1987-2000 period are estimated to be about 480 million pounds U_3O_8.

U.S. suppliers reported a total of 127 million pounds U_3O_8 in delivery commitments to domestic utilities for the 1987-1995 period. These suppliers also estimated that an additional 226 million pounds U_3O_8 could be available for delivery in this period, compared to about 169 million pounds of U.S. utility requirements during the same period that are not covered by supply contracts.

Further information on uranium supply and demand are presented in two Energy Information Administration reports, the Uranium Industry Annual 1985, and Domestic Uranium Mining and Milling Industry, 1985 Viability Assessment.

QUESTIONS FROM SENATOR FORD

Q2: Where will the supply come from -- production? -- imports? -- inventory?

A: The uranium used to fuel reactors comes from purchases by utilities directly from domestic and foreign suppliers, and the removal of uranium from utility inventories.

Total U.S. utility requirements in 1985, as measured by deliveries to enrichment plants, were supplied in almost equal quantities from domestic production, imports and inventory drawdowns. Over the next few years, imports are projected to account for an increasing share of the domestic uranium market, while domestic production is expected to decrease its share. In the middle and late 1990's, the market share supplied by imports is projected to remain relatively constant. During the 1990's domestic production is projected to comprise 28 to 39 percent of the domestic market and imports between 51 and 58 percent, with the remaining needs coming from inventory drawdowns.

QUESTIONS FROM SENATOR FORD

Q3: What is the status of U.S. utilities commitments for foreign source uranium? How much is being imported, and from where?

A: In 1985, 11.7 million pounds of uranium were imported; 6.6 million pounds were imported directly by 19 utilities and the remainder was imported by six suppliers. Of the material imported in 1985, 58 percent was of Canadian origin, and 42 percent was of South African origin. For import commitments for delivery during the period beyond 1985, 61 percent are of Canadian origin, 19 percent of South African origin, and 20 percent of Australian origin.

QUESTIONS FROM SENATOR FORD

Q4: What are current prices for domestic uranium? What are current prices for imported uranium?

A: The reported price for deliveries by domestic suppliers in 1985 averaged $31.43 per pound of uranium of which 2.1 million pounds of uranium were delivered under contracts signed in 1985 at a weighted average price of $15.13 per pound.

The price paid for 1985 import deliveries averaged $20.08 per pound of uranium.

Uranium prices for transactions between utilities and suppliers in 1986 are presently being collected by the Energy Information Administration and will be made available later this year. The spot world market price of uranium at the end of 1986 was $16.75 per pound, as reported by NUEXCO in its monthly report on the nuclear fuel market.

QUESTIONS FROM SENATOR FORD

Q5: What prices are needed for U.S. producers in order for the domestic uranium industry to be viable?

A: Criteria for use in determining the viability of the industry were promulgated by the Secretary of Energy by rule (10 CFR Part 761) and published in the October 6, 1983 issue of the Federal Register after public hearings. These criteria include resource capability, supply response capability, financial capability, and import commitment dependency. The viability criteria are structured around the belief that a viable domestic uranium industry is one that can meet domestic requirements for a future 10-year period under a range of eventualities, such as in the event of a disruption of imported uranium supplies.

Thus, price is not the sole determining factor in the uranium industry's viability. On the other hand, we can provide the Subcommittee with information about the impact of higher prices on U.S. uranium production capability. U.S. producers report to the EIA that, at future prices below $20 per pound of U_3O_8 (in constant 1985 dollars), about 1 million pounds of U_3O_8 could be produced annually for new sales, that is, above the level of current commitments. At prices of $30 per pound, about 15 million pounds could be produced annually for new sales in the next decade. At prices of $40 per pound, about 22 million pounds could be produced annually for new sales.

QUESTIONS FROM SENATOR FORD

Q6: What prices are projected for the 1990's? How do these prices differ from current prices and what factors does EIA think caused this difference?

A: The long-term contract price for uranium is projected to be about $18 per pound of uranium through 1991 and then gradually rise to $28 per pound by the year 2000 (constant 1985 dollars). The spot market price, which averaged $15.60 per pound during 1985, also is projected to behave rather similarly although increasing more rapidly to a high of $32 in the year 2000. The projected prices are expected to increase in future years because of greater world demand for uranium to fuel completed power plants and the reduced availability of lower cost supplies.

QUESTIONS FROM SENATOR FORD

Question 7:	Please provide information on your best estimates of reclamation costs for cleaning up mill tailings at UMTRCA Title II sites? Please include the amount that you believe the uranium industry has set aside to pay these cleanup costs.
Answer:	The Department's experience in managing the cleanup of Title I mill tailing sites shows that $25 per ton, on average, is expended in meeting EPA standards, with NRC concurrence, at these 24 former processing sites. However, economies of scale associated with stabilizing the larger Title II sites, and the expectation that few Title II sites will have to be relocated, lead the Department to believe this figure would be reduced to the $5 to $10 per ton range for the Title II sites. In addition, the Title I program costs reflect direct Federal Government management, which is not needed for managing the cleanup of the Title II sites. Without Federal management of the cleanup activities, we have broadly estimated that costs for the cleanup of Title II tailings sites could be reduced an additional 30 percent below the costs DOE has incurred in administering the Title I program. On the other hand, we recognize that there is very little actual experience in remediation of Title II sites and very little detailed information available to the Department on these sites upon which to base an estimate or comparison

Answer 7 (continued): with the Title I program. Experience strongly suggests that estimates made under these conditions can be expected to increase as more information becomes available. Therefore, DOE believes a wide range of cost estimates must be accepted at this stage, and has placed this range for the 190 million tons of tailings at the Title II sites at $1 to $2 billion. We understand that current NRC and agreement State surety arrangements for the Title II sites total approximately $210 million, and that a review is underway for a substantial number of the sites. Updated surety arrangements at these sites should exist in about 1 year.

QUESTIONS FROM SENATOR FORD

Question 8: What is your estimate of the cost per ton of reclamation of mill tailings from the Title II sites.

Answer: Based on the factors described in response to the previous question, we would expect the cost per ton for reclamation of Title II site mill tailings to fall in the range of approximately $5 to $10.

QUESTIONS FROM SENATOR DOMENICI

Question 9:	In view of EIA's finding of "nonviability" of the uranium industry for the second year in a row, does DOE plan to continue the remedies it put in place last year, with respect to free variable tails assay options and curtailing drawdown of the stockpile? Why or why not? Will you request that the U.S. Trade Representative take any action? Why or why not?
Answer:	DOE will continue to offer a free variable tails assay option in the range of 0.2 percent U-235 to 0.3 percent U-235 to all of its enrichment services customers, regardless of the percentage of their requirements contracted from DOE. This helps to increase the purchases of natural uranium by our enrichment services customers. However, since there is no effect on the mining and milling industry whether or not we draw down our stockpile by overfeeding, we are maximizing the production of separative work by operating at an average tails assay slightly higher than the average tails assay at which our customers transact. This is completely consistent with the provisions of the FY 1987 Continuing Resolution that allows DOE to use its uranium stockpile "to increase its operating efficiency or reduce its other production costs (such as electricity)," if such steps do not "result in reducing the amount of uranium DOE's customers must provide to DOE compared to the amount of uranium those customers would be required to provide without 'overfeeding' from the stockpile."

Answer 9
(continued):

DOE does not plan to request that the U.S. Trade Representative take any action under existing law. On December 26, 1985, the U.S. Trade Representative determined that action under U.S. trade statutes did not "appear to be appropriate in regard to both the short- and long-term problems facing the domestic uranium mining and milling industry. Moreover, any remedy granted under existing law which might provide the extent of relief requested by the industry would only be short-term, while at the same time having an adverse impact on our trade and other relations with important trading partners without resolving the long-term problems of the industry." We believe the reasons that led to this finding have not changed and it would not be productive to request another determination from the U.S. Trade Representative.

QUESTIONS FROM SENATOR DOMENICI

Q2: In the 1984 viability assessment, DOE's estimate of percent imports (as reported to USTR Clayton Yeutter) was 37.4% (suspiciously close to the 37.5% trigger point in 170B of the AEA). Yet, on page 81 of the 1985 viability study, that estimate for 1984 is shown as 39.2%. Which number is correct? Assuming that your 1985 percentage is also subject to revision when you do your 1986 study, it could also easily exceed the 37.5% trigger point, in which case we would end up with two consecutive years at greater than 37.5% imports. Do you consider this a plausible scenario? What actual percentages will you use with reference to the 170B requirements? (I would hope you would use the most up-to-date and accurate ones).

A: Uranium imports in 1984 were 39.2% of domestic utility requirements as reported in the 1985 viability assessment report (DOE/EIA-0477(85)). The 1984 report (DOE/EIA-0477(84)), published in September 1985, reported uranium imports to be 37.4% of requirements. However, this estimate was based on incomplete responses from utilities on Form EIA-858, "Uranium Industry Annual Survey" (1984) (see "sources" of both Tables 30 and 31). The final data, based on complete survey responses, were reported in the Uranium Industry Annual (DOE/EIA-0478(84)) (see Table 47, pg 89), published in October 1985, and the revised estimate of percent imports was then reported in the 1985 viability assessment report. This year the data collection on the uranium industry annual survey is proceeding on a more timely basis than previous years, and thus we do not anticipate the need to base the viability assessment report on preliminary data. In satisfying the conditions of Section 170B, the Energy Information Administration will provide the most up-to-date information collected on the Uranium Industry Annual Survey.

QUESTIONS FROM SENATOR DOMENICI

Question 11: I'd like to quote a few excerpts from a paper written by a Canadian author from a Canadian perspective, concerning Canadian uranium exports to the U.S.:

(Reference: David Haglund, "Protectionism and National Security: The Case of Canadian Uranium Exports to the U.S.")

- "It is no secret that Canada uranium is selling in the United States at prices lower -- often far lower -- than the price Canadian uranium sells for at home."

- The Saskatchewan producers... sell in the foreign market, at prices lower, to be sure, than those that Ontario producers are fortunate to command from Canadian consumers."

- "Ontario Hydro (a major Canadian nuclear utility) is paying its long-term (uranium) suppliers what amounts to a premium of more than 100 per cent."

- "...Canada forces its uranium mills to ship their U308 to Ontario's conversion facility (for conversion to UF6 prior to export), thus... limiting the amount of business available to the two American conversion operations run by Allied Chemical and Kerr-McGee."

Here we have a Canadian author, who basically believes that Canada's trade practices are "fair", and yet he himself admits that their market is skewed. How can our own U.S. Trade Representative refuse to look into a situation that even the Canadians admit is an unlevel playing field?

Answer: This subject falls within the purview of the U.S. Trade Representative. Therefore, it is inappropriate for the Department to comment further.

QUESTIONS FROM SENATOR DOMENICI

Question 12: If "free trade" between the U.S. and Canada is considered so important to this Administration, why isn't the Administration objecting to the Canadian requirements that all Canadian uranium for export must first be converted to UF6 at Canadian conversion plants prior to export?

Answer: This subject falls within the purview of the U.S. Trade Representative. Therefore, it is inappropriate for the Department to comment further.

QUESTIONS FROM SENATOR DOMENICI

Question 13(a): The Canadian export policy, with respect to uranium, is designed to maintain a stable market by assuring adequate supplies for domestic and international needs (see last year's hearing record, S.Hrg. 99-673, page 213). To this end, Canada sees to it that 30 years of fueling requirements are met for their own domestic use. All export contracts are required to contain floor prices, or a "similar mechanism" which protect investment and employment in their uranium production facilities.

Do our U.S. export contracts contain similar provisions? If not, would adoption of such provisions improve our competitive position with respect to the international market?

Answer: This subject falls within the purview of the U.S. Trade Representative. Therefore, it is inappropriate for the Department to comment further.

QUESTIONS FROM SENATOR DOMENICI

Question 13(b): Do you have any details about what Canada's floor prices or "similar mechanisms" are? If not, why isn't the U.S. Trade Representative investigating this in more detail?

Answer: This subject falls within the purview of the U.S. Trade Representative. Therefore, it is inappropriate for the Department to comment further.

Department of Energy
Washington, DC 20585

June 24, 1987

Honorable Wendell H. Ford
Chairman, Subcommittee on
Energy Research and Development
Committee on Energy and
  Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

On March 9, 1987, David Rossin, Assistant Secretary for Nuclear Energy appeared before the Senate Committee on Energy and Natural Resources to discuss the domestic uranium mining industry and uranium mill tailings.

Following that hearing, you submitted written questions for our response to supplement the record. On May 1, 1987, we provided responses to those questions. In order to provide a more complete response to questions 11 through 13 from Senator Domenici, the Department contacted the Office of the U.S. Trade Representative, which provided the enclosed material. This material also has been sent directly to the Committee staff.

If you have any questions, please call Mike Gilmore or Tom Todd on 586-4277. They will be happy to assist.

Sincerely,

Thomas Todd
for Robert G. Rabben
Assistant General Counsel
for Legislation

Enclosure

ADDITIONAL INFORMATION
RELATING TO THE
MARCH 9, 1987 HEARING
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
WITNESS: A. DAVID ROSSIN
ASSISTANT SECRETARY FOR NUCLEAR ENERGY
U.S. DEPARTMENT OF ENERGY

QUESTIONS FROM SENATOR DOMENICI

Question 11: The following excerpts are from a paper written by a Canadian author from a Canadian perspective, concerning Canadian uranium exports to the United States (reference: David Haglund, "Protectionism and National Security: The Case of Canadian Uranium Exports to the U.S."):

- "It is no secret that Canadian uranium is selling in the United States at prices lower -- often far lower -- than the price Canadian uranium sells for at home."
- "The Saskatchewan producers ... sell in the foreign market, at prices lower, to be sure, than those that Ontario producers are fortunate to command from Canadian consumers."
- "Ontario Hydro (a major Canadian nuclear utility) is paying its long-term (uranium) suppliers what amounts to a premium of more than 100 per cent."
- "... Canada forces its uranium mills to ship their U3O8 to Ontario's conversion facility (for conversion to UF6 prior to export), thus ... limiting the amount of business available to the two American conversion operations run by Allied Chemical and Kerr-McGee."

Here we have a Canadian author, who basically believes that Canada's trade practices are "fair", and yet he himself admits that their market is skewed. How can our own U.S. Trade Representative refuse to look into a situation that even the Canadians admit is an unlevel playing field?

Answer: (The following information was subsequently provided by the Office of the U.S. Trade Representative:)

Mr. David Haglund is a member of the academic community in Canada; thus, his characterizations do not represent Canadian policy since he is not a Canadian Government official.

Answer 11 (continued): In 1985, the U.S. Trade Representative chaired a U.S. Government interagency group that reviewed Canadian uranium policies. The issues mentioned by Mr. Haglund were all examined. Of particular importance is the Canadian Government's requirement that all uranium be converted to uranium hexafluoride prior to export. This is the subject of a November 1986 GATT complaint brought by the U.S. Trade Representative, after the failure of nearly a year's negotiation to resolve the issue on a bilateral basis with the Canadian Government.

QUESTIONS FROM SENATOR DOMENICI

Question 12:	If "free trade" between the U.S. and Canada is considered so important to this Administration, why isn't the Administration objecting to the Canadian requirement that all Canadian uranium for export must first be converted to UF6 at Canadian conversion plants prior to export?
Answer:	(The following information was subsequently provided by the Office of the U.S. Trade Representative:) The U.S. Trade Representative has objected to the Canadian requirement and has taken the Canadians to GATT on the question. The case is being pursued.

QUESTIONS FROM SENATOR DOMENICI

Question 13(a): The Canadian export policy, with respect to uranium, is designed to maintain a stable market by assuring adequate supplies for domestic and international needs (see last year's hearing record, S. Hrg. 99-673, page 213). To this end, Canada sees to it that 30 years of fueling requirements are met for their own domestic use. All export contracts are required to contain floor prices, or a "similar mechanism", which protect investment and employment in their uranium production facilities. Do our U.S. export contracts contain similar provisions? If not, would adoption of such provisions improve our competitive position with respect to the international market?

Answer: (The following information was subsequently provided by the Office of the U.S. Trade Representative:)

U.S. export contracts do not contain such a provision. Since Canada is a net exporter of uranium, they may be concerned whether their requirements can be met. On the other hand, the United States is a net importer of uranium; thus, such a provision would reduce the uranium available for export and would virtually eliminate any uranium exported from the United States.

QUESTIONS FROM SENATOR DOMENICI

Question 13(b):	Do you have any details about what Canada's floor prices or "similar mechanisms" are? If not, why isn't the U.S. Trade Representative investigating this in more detail?
Answer:	(The following information was subsequently provided by the Office of the U.S. Trade Representative:) The U.S. Trade Representative (and the Department of Energy) are not aware of a floor price, or similar mechanisms, in Canadian uranium export contracts. Indeed, if a floor price were set, this would tend to lessen the likelihood of unfair pricing. If the United States itself were to adopt such a provision, U.S. uranium could become less attractive on the world market.

FOLLOW-UP QUESTIONS FROM
MARCH 9, 1987

From: Sen. Ford

QUESTIONS FOR DOE/NE

1. Is it your impression that there have been a significant number of new commitments for foreign source uranium (both natural and enriched) since mid-1986?

2. Is DOE currently enriching foreign source uranium? If so, in what statute do you get the authority to do that?

3. Is the enrichment for foreign or domestic use? What percentage of each?

4. Is any of this uranium from South Africa? Does the Department believe that they have the authority to enrich South African uranium?

-Has any South African uranium been enriched since the Antiapartheid Act took effect on January 2, 1987?

-Please explain.

5. If the final Treasury rule does not permit the importation of uranium ore or oxides from South Africa, how does that affect the DOE enrichment enterprise?

-What is the dollar value of lost enrichment sales to DOE if the enrichment of South Africa uranium is prohibited?

-Who would be liable in court for breaking contracts if the Antiapartheid Act regulations prohibit offering enrichment services for South African uranium?

-How big would DOE's exposure be?

6. Please provide an analysis for the record of how long it would take to reopen the mines and re-create the production capability if the uranium mines closed?

-How much would this cost?

7. In a briefing paper done by the General Accounting Office (GAO) and submitted for the record of our Subcommittee hearing in July, 1985, GAO, using data obtained from the Nuclear Regulatory Commission (NRC), estimated that the cost per ton of cleaning up the tailings was approximately $1.36/ton.

-What is your estimate?

-Please describe the key uncertainties in your analysis of costs for the reclamation of these sites which might cause it to differ from the GAO estimate?

-What are the important factors to consider when making an estimate of mill tailings cleanup costs?

-Does the cost depend upon the level of health risk?

8. The National Academy of Sciences (NAS) published a study in 1986 which concludes among other things, that health risks of uranium mill tailings to the average citizen are trivial. The Environmental Protection Agency (EPA), which issued regulations in 1983 for mill tailings cleanup, does not believe that the NAS study provides a basis for reconsidering their standards.

-Please comment on the study, as well as on the effect of the 1983 EPA regulations on the cleanup costs of the tailings.

9. Do you believe that EPA should reconsider its mill tailings regulations? Explain.

10. Last year, this Committee reported out S. 1004, which contained a cost sharing of approximately 37% of the funds coming from the site licensees, 37% coming from the utilities, and approximately 25% coming from the Federal government.

-How should the costs of cleanup of uranium mill tailings be apportioned?

From: Sen. Ford

ADDITIONAL QUESTIONS FOR DOE

Hearing on Uranium Mining and Mill Tailings Reclamation
March 9, 1987

Canadian Subsidies

The Uranium Producers of America claim in their statement that Canada is subsidizing its uranium exports. Specifically, they say on page 8 that

> "export prices for Canadian uranium are well below the prices charged on the Canadian market."

Is this true? What does DOE (or EIA) know about this charge?

NRC Cost Data for Reclamation

Last year the NRC staff updated previous work that they had done on the costs of uranium mill tailings reclamation. Your last year's estimate of costs of $4 billion (or $20 per ton) was very high. NRC's estimate of $270 million (or $1.35 per ton) was very low. So far NRC has declined to explain their numbers.

If I give you a copy of what NRC provided last year, could you have your people analyze it and comment?

Questions for the Record
from Senator Dale Bumpers
March 9, 1987 - Uranium Mining Issues Hearing

For Dr. Rossin and/or Mr. Merklein - Department of Energy

1. Do we have adequate supplies of domestic uranium for national security uses - fueling our nuclear submarines and producing nuclear weapons? Will we have adequate supplies in the future, i.e., ten, twenty, or fifty years hence? If not, what percentage of our military uranium needs will have to be met with imports? Does the Administration consider the necessity of importing uranium for military uses a national security problem?

2. Would a fifty percent import restriction have a positive or negative impact on national security?

3. An MIT study quoted in a New York Times editorial on September 25, 1986 estimated that uranium prices would double and that electricity cost would increase by up to $800 million over five years. Is this a reasonable estimate? Under DOE's or EIA's calculations, how much would the pric~~e of~~ domestic uranium rise under a fifty percent import restriction? What would the total cost increase be for U.S. nuclear utilities and their customers?

4. What impact would an import restriction have on the ability of DOE's enrichment program to be competitive in the world market?

Question for the Utility panel

1. An MIT study quoted in a New York Times editorial on September 25, 1986 estimated that uranium prices would double and that electricity cost would increase by up to $800 million over five years. Is this a reasonable estimate? Under DOE's or EIA's calculations, how much would the price of domestic uranium rise under a fifty percent import restriction? What would the total cost increase be for U.S. nuclear utilities and their customers?

From: Sen. Bingaman

QUESTIONS FOR MR. ROSSIN
March 9, 1987

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1) DOE some years ago surveyed the kinds of supports Canada and other countries afford their uranium industry -- the so-called Patterson report. Could you supply a copy for the record, along with any update, if not today, by Thursday noon?

Is it true that Canada bars export of its uranium for military purposes, including naval propulsion and strategic defense?

If Canada or other major suppliers limit export for military purposes, does it follow that a viable domestic uranium industry is important to U.S. national security? If it is not, why not?

2) DOE, in its "Commingled Tailings Study" issued in 1982, recognized a moral obligation for the federal government to bear a fair share of the costs of reclaiming tailings generated under old AEC contracts at so-called Commingled Tailings Sites. Does DOE continue to recognize such an obligation or has morality changed in the last several years? Does DOE support or oppose commingled tailings legislation providing for reimbursement for the federal share, and is the Department prepared to work with us in formulating such legislation?

QUESTIONS FROM SENATOR FORD

Question 1:	Is it your impression that there have been a significant number of new commitments for foreign source uranium (both natural and enriched) since mid-1986?
Answer:	The Energy Information Administration (EIA) is currently conducting a survey of the domestic nuclear power industry for its Uranium Industry Annual Report. The survey will provide specific information regarding new commitments for foreign source uranium. However, EIA survey results will not be available for several months. We will be pleased to provide the information as soon as it is available.

QUESTIONS FROM SENATOR FORD

Question 2: Is DOE currently enriching foreign source uranium? If so, in what statute do you get the authority to do that?

Answer: DOE is currently enriching foreign source uranium for customers as permitted under the Atomic Energy Act of 1954.

QUESTIONS FROM SENATOR FORD

Question 3: Is the enrichment for foreign or domestic use? What percentage of each?

Answer: In 1986, 11.6 million kgs of foreign origin uranium were delivered to DOE's gaseous diffusion plants by utility customers. This amount represents 37 percent of all feed delivered to DOE's enrichment plants. Of the 11.6 million kgs of foreign origin uranium enriched by DOE, about 60 percent was for foreign end use and approximately 40 percent for use by domestic customers.

QUESTIONS FROM SENATOR FORD

Question 4(a):	Is any of this uranium from South Africa?
Answer:	In 1986, about 20 percent of the total foreign origin feed delivered to DOE's enrichment plants was of South African origin. About 70 percent of the South African origin uranium delivered to DOE was enriched for foreign end use, and 30 percent was for use in domestic reactors.

QUESTIONS FROM SENATOR FORD

Question 4(b): Does the Department believe that they have the authority to enrich South African uranium?

Answer: DOE will enrich South African uranium only as authorized by law. Therefore, the enrichment of South African uranium by DOE will be performed consistent with sanctions imposed by enactment of the Comprehensive Anti-Apartheid Act of 1986 and the Treasury Department's regulations for implementing section 309(a) of the Act. On March 10, 1987, the Treasury Department published a rule in the Federal Register regarding the importation of South African uranium. Important points included in this rulemaking are:

- Uranium Hexaflouride (UF6) is not covered by the restrictions.
- Uranium ore and oxides of South African origin may be imported into the country for processing and subsequent export for an interim period ending July 1, 1987, to allow the Treasury Department time to further define Congressional intent of the sanctions covered under the Act.
- In all cases, specific import licenses issued by the NRC are required in order to import any material derived from South African uranium.

QUESTIONS FROM SENATOR FORD

Question 4(c): Has any South African uranium been enriched since the Antiapartheid Act took effect on January 2, 1987? Please explain.

Answer: Since January 2, 1987, the Department has and will continue to comply with the Comprehensive Anti-Apartheid Act of 1986 with respect to the enrichment of South African uranium. Some uranium of South African origin is being enriched for foreign customers consistent with rulemaking designed to implement the Act.

QUESTIONS FROM SENATOR FORD

Question 5(a):	If the final Treasury rule does not permit the importation of uranium ore or oxides from South Africa, how does that affect the DOE enrichment enterprise?
Answer:	A significant number of DOE enrichment customers purchase South African uranium and, therefore, would be impacted by any restriction placed on the importation of uranium ore and uranium oxide if the Treasury Department's final regulations do not permit the material to enter the United States for processing and subsequent export. DOE could potentially lose 20 to 30 percent of its annual sales (worth $200 to $300 million), if affected customers chose to leave DOE for one of several other foreign enrichment suppliers, including Eurodif, Urenco, or the Soviet Union. In addition to the enrichment sales impact, U.S. commercial uranium conversion companies and fuel fabricators could face losses of hundreds of millions of dollars. These losses represent an adverse effect on the U.S. balance of trade as well as relations with allies who are supportive of our nuclear nonproliferation policies.

QUESTIONS FROM SENATOR FORD

Question 5(b): What is the dollar value of lost enrichment sales to DOE if the enrichment of South Africa uranium is prohibited?

Answer: The dollar value of lost enrichment sales is potentially $200 to $300 million each year if the enrichment of South African uranium is prohibited. Since no domestic utilities are purchasing South African uranium, these losses are associated with foreign enrichment sales only. This represents a decrease in exports and a negative impact on the U.S. balance of payments position.

QUESTIONS FROM SENATOR FORD

Question 5(c): Who would be liable in court for breaking contracts if the Antiapartheid Act regulations prohibit offering enrichment services for South African uranium?

Answer: Although it is unlikely that liability would be agreed upon between the two parties to the enrichment contract, DOE's customers would view the inability to enrich South African uranium as just cause to plead Force Majure, and thereby assert that they are relieved of all enrichment obligations under their DOE contract. It is also possible that DOE's affected customers may sue DOE for breach of contract on the basis that DOE is unable to meet its contractual obligations to enrich uranium without restriction as to country of origin, as allowed in the Utility Services contract.

QUESTIONS FROM SENATOR FORD

Question 5(d):	How big would DOE's exposure be?
Answer:	Through cancellations DOE could lose 20 to 30 percent of its annual sales base, valued at $200 to $300 million each year. Significant financial losses could occur through breach of contract findings if a court decided that customers incurred damages from DOE refusing to enrich the uranium feed that was delivered to the enrichment plants.

QUESTIONS FROM SENATOR FORD

Question 6: Please provide an analysis for the record of how long it would take to reopen the mines and re-create the production capability if the uranium mines closed? How much would this cost?

Answer: We are not aware of an analysis that addresses this issue. The issue is complex and conditions vary from mine to mine.

The Energy Information Administration (EIA), as part of its viability assessment work, does evaluate the ability of the domestic industry to respond to increases in demand due to various scenarios that assume disruptions in the imported uranium supply. This is discussed in Chapter 6 and Appendix D of the 1985 Viability Assessment Report. (Copy attached)

QUESTIONS FROM SENATOR FORD

Question 7(a): In a briefing paper done by the General Accounting Office (GAO) and submitted for the record of our Subcommittee hearing in July, 1985, GAO, using data obtained from the Nuclear Regulatory Commission (NRC), estimated that the cost per ton of cleaning up the tailings was approximately $1.36/ton. What is your estimate?

Answer: The Department's experience in managing the cleanup of Title I mill tailing sites shows that $25 per ton, on average, is expended in meeting the EPA standards, with NRC concurrence, at these 24 former processing sites. However, economies of scale associated with stabilizing the larger Title II sites and the expectation that few Title II sites will have to be relocated leads the Department to believe that this figure would be reduced to the $5- to $10-per-ton range for the Title II sites. In addition, the Title I program costs reflect direct Federal Government management, which is not needed for the Title II sites. Without Federal management of the cleanup activities, we have broadly estimated that costs for the cleanup of Title II tailings sites could be reduced an additional 30 percent below the costs DOE has incurred in administering the Title I program. On the other hand, there is very little actual experience in remediation of Title II sites and very little detailed information available to the Department on these sites upon

Answer 7(a)
(continued): which to base an estimate or comparison with the Title I program. Experience strongly suggests that estimates made under these conditions can be expected to increase as more information becomes available.

DOE has reviewed the July 1985 briefing paper prepared by the General Accounting Office for use by the House Interior and Insular Affairs Subcommittee on Energy and the Environment prior to conducting hearings on then-pending legislation (the Uranium Mill Tailings Reclamation Act of 1985). We have also communicated recently with Nuclear Regulatory Commission (NRC) staff members on the current surety arrangements the NRC and agreement states have in place for reclamation at Title II sites. The current NRC staff estimate for Title II sites is on the order of $210 million, largely based on preliminary reclamation cost estimates prepared by the licensees as part of their site reclamation plan. The licensees' reclamation estimate is for construction only and does not include cost for such items as engineering, site and tailings characterization, environmental impact analysis, and project and construction management. These items are included in the Department's estimate whereas we understand the licensees include these costs as part of their on-going site operating cost and not part of the site reclamation cost.

Answer 7(a) (continued): The NRC is in the process of reviewing the reclamation plans to ensure the plans meet Environmental Protection Agency standards for the 86 million tons of tailings located in New Mexico. This represents approximately one-half of the total volume of Title II tailings to be stabilized. In 1986, the State requested the NRC to assume regulatory authority for the sites. Previously, the reclamation plans and costs were based on meeting State standards. It is reasonable to assume that the reclamation plans for the New Mexico sites will be revised and this may lead to an increase in the surety requirements. Updated surety arrangements at a majority of the sites should exist in about 1 year.

DOE expects that the disparity between the Department's cost estimate and the surety arrangements would be significantly reduced after: (1) an allowance is made for differences between the scopes of work included in the estimates prepared by the two agencies; (2) the New Mexico sites have NRC-approved reclamation plans; and (3) allowances are made for differences on construction complexity between the Title I and Title II sites. As a result, the Department believes a wide range in the estimates must be accepted at this stage, and has placed this range for the 190 million tons of tailings at the Title II sites at $1 to $2 billion.

QUESTIONS FROM SENATOR FORD

Question 7(b): Please describe the key uncertainties in your analysis of costs for the reclamation of these sites which might cause it to differ from the GAO estimate?

Answer: Since the Department's estimates are based directly on its experience in carrying out the Title I program, the key uncertainties associated with its estimates are the differences between the Title I and Title II programs. As mentioned above, economies of scale, fewer pile relocations, and project management by individual site owners rather than the Federal Government are all factors which have been identified and taken into account. Other factors which could produce differences include activities undertaken by Title II mill site owners as part of operations which are not identified as cleanup costs. Such activities as site characterization, engineering, project management, environmental impact analysis, monitoring and surveillance, and partial reclamation could be covered as current or past operating expenses and be excluded from estimates of reclamation costs; however, these would all be included costs for the inactive (Title I) sites program. Such factors are owner and site specific and can be understood only by careful analysis of individual site characteristics and reclamation requirements.

QUESTIONS FROM SENATOR FORD

Question 7(c): What are the important factors to consider when making an estimate of mill tailings cleanup costs?

Answer: Reliable cost estimates can be obtained only by careful analysis of individual site characteristics and by developing specific design concepts that could meet EPA and NRC requirements for that site. Based on the Department's Title I program experience, important factors affecting cleanup cost include (1) site geology; (2) proximity to ground and surface waters; (3) maximum predicted conditions of precipitation and flood; (4) availability of suitable radon barrier material; (5) availability of pile cover rock of suitable durability; and (6) average soil moisture levels.

QUESTIONS FROM SENATOR FORD

Question 7(d): Does the cost depend upon the level of health risk?

Answer: Prevention of substantial health risk to the public is the primary factor behind the standards for Title II mill tailings reclamation developed by EPA and the regulations to enforce those standards developed by NRC. However, the difficulty and, therefore, the cost associated with meeting the standards at various sites is primarily a function of the characteristics of the individual site, as described previously, and is only indirectly related to health risk.

QUESTIONS FROM SENATOR FORD

Question 8:	The National Academy of Sciences (NAS) published a study in 1986 which concludes among other things, that health risks of uranium mill tailings to the average citizen are trivial. The Environmental Protection Agency (EPA), which issued regulations in 1983 for mill tailings cleanup, does not believe that the NAS study provides a basis for reconsidering their standards. Please comment on the study, as well as on the effect of the 1983 EPA regulations on the cleanup costs of the tailings.
Answer:	The Department believes that the NAS study supports its position that EPA should reconsider the mill tailings standards, particularly with regard to establishing less stringent standards for medium- and low-priority sites. As you point out, the report concludes that--

> "the health risks posed by exposure to radon from uranium mill tailings piles are trivial for the average U.S. citizen, range from small to modest for most persons who live close to piles, but in special circumstances could be significant for a few individuals who live in close proximity to certain uncontrolled piles" (emphasis added).

The Department's position is that standards specifically designed to limit the emission of radon from the low- and medium-priority sites are not required. These sites are remote from local and regional populations, the incremental contribution of these sites to the radon background on a national or global basis is of negligible significance, and, moreover, some radon attenuation will be provided by the

Answer 8 (continued): measures taken to provide stability against erosion by wind and water.

A second key conclusion of the 1986 NAS study is that "(b)ecause of the variability of physical, chemical, radiological, and demographic factors at each site, risk-management strategies must be site specific." This conclusion carries over into two specific recommendations for the use of site specific approaches to controlling groundwater and surface water contamination and radon release from the piles. Although Public Law 95-604 required that EPA standards be promulgated as "standards of general application," the ground water protection provisions of the Title I EPA standards were set aside by the U.S. Court of Appeals for the Tenth Circuit and remanded to EPA for reconsideration based on their not meeting this requirement of the law. Congress may wish to consider amending Public Law 95-604 so that EPA may respond to this conclusion of the NAS study. The Department believes such a change would allow and encourage standard revisions by EPA that would improve the cost effectiveness of both ground and surface water and radon control measures at mill tailings sites, including the adoption of less stringent controls at low- and medium-priority sites.

Answer 8
(continued):

The cost of meeting the EPA standards (with NRC concurrence) for the Title I mill tailings program is exceeding the original expectations of all those involved in the formulation of the legislation and subsequent execution of the program. DOE believes this experience will carry over to the necessary remediation of the Title II sites, with costs significantly exceeding early estimates. The Department considers this adequate justification for EPA to undertake a review and revision of the mill tailing standards, and that the NAS study provides further support for this view.

QUESTIONS FROM SENATOR FORD

Question 9: Do you believe that EPA should reconsider its mill tailings regulations? Explain.

Answer: The Department maintains that EPA should reconsider its mill tailings regulations. DOE first expressed this belief during the development of the standards by providing extensive oral and written comments to EPA. Many of the comments pointed out aspects of the standards which DOE considered as being overly conservative and likely to lead to higher costs than justified by the modest health and safety benefits to be gained. To some extent, the final standards issued by EPA reflected the Department's comments and concerns, but were still considered by us to be more stringent than necessary to adequately protect public health and safety over the long-term. This was reflected, in part, in the Department's response to EPA's 1983 announcement of a proposed rulemaking on whether different standards than those promulgated should be applied to the medium- and low-priority sites.

As recently as August 1986, the Department requested that EPA update the cost-benefit analyses used in selecting the standards and to reconsider separate, less stringent standards for medium- and low-priority sites. DOE believes that the actual cost of remediation--which is more than double the estimate used by EPA when the standards were developed--should be used by EPA to update its cost-benefit analysis. The large increase in remediation cost further supports the Department's position that separate standards should be selected for the medium- and low-priority sites.

QUESTIONS FROM SENATOR FORD

Question 10: Last year, this Committee reported out S. 1004, which contained a cost sharing of approximately 37 percent of the funds coming from the site licensees, 37 percent coming from the utilities, and approximately 25 percent coming from the Federal Government. How should the costs of cleanup of uranium mill tailings be apportioned?

Answer: Public Law 95-604 assigns the responsibility for cleanup of active (Title II) tailings sites to the site owner as a condition of its license to do business. If Congress passes a new law and there is to be a Federal Government and a nuclear utility contribution to cleanup of the Title II tailings sites, the Department believes the apportionment proposed by S. 1004 last year is reasonable. S. 1004 provided for a Federal share which was consistent with the fraction of Title II tailings produced for sale to the Federal Government.

QUESTIONS FROM SENATOR FORD

Canadian Subsidies

Question 11: The Uranium Producers of America claim in their statement that Canada is subsidizing its uranium exports. Specifically, they say on page 8 that

> "export prices for Canadian uranium are well below the prices charged on the Canadian market."

Is this true? What does DOE (or EIA) know about this charge?

Answer: Although we cannot address all uranium pricing situations in Canada, we are aware that, because a Canadian utility signed a long-term contract about 8 years ago, the utility is paying about $43 (U.S.) per pound of uranium concentrate. Several U.S. utilities that signed contracts in the same timeframe are paying comparable prices to U.S. uranium producers. Often, these long-term contract prices are misconstrued as a market price contract.

In his December 26, 1985, letter to the Secretary of Energy addressing this allegation, the U.S. Trade Representative advised that self-initiation of countervailing duty or anti-dumping investigations would be ineffective or inappropriate. However, the U.S. mining and milling industry is free to file petitions of its own with the Department of Commerce and the International Trade Commission if it believes such actions are a cause of material injury or threat thereof.

QUESTIONS FROM SENATOR FORD

Question 12:	Last year the NRC staff updated previous work that they had done on the costs of uranium mill tailings reclamation. Your last year's estimate of costs of $4 billion (or $20 per ton) was very high. NRC's estimate of $270 million (or $1.35 per ton) was very low. So far NRC has declined to explain their numbers. If I give you a copy of what NRC provided last year, could you have your people analyze it and comment?
Answer:	The Department's cost estimate was prepared on the assumption that some comparability existed between the proposed Title II reclamation program and DOE's Title I cleanup program for inactive sites. Our estimate is based on 4 years of actual design and construction experience. Using actual Title I cost experience, an attempt was made to reasonably adjust DOE's cost experience to allow for possible differences between Title I and Title II sites. Utilizing Title I experience and allowing for economies of scale and low probability of relocating tailings to other sites for disposal suggests that unit costs for reclamation at Title II sites would range from $5 to $10 per dry ton. Assuming 190 million tons of tailings, DOE estimates that the costs for stabilizing Title II sites could range from $1 to $2 billion. This rough estimate would not include costs for groundwater restoration and vicinity property remedial actions.

Answer 12 (continued): DOE has reviewed the July 1985 briefing paper prepared by the General Accounting Office for use by the House Interior and Insular Affairs Subcommittee on Energy and the Environment prior to conducting hearings on then-pending legislation (the Uranium Mill Tailings Reclamation Act of 1985). We have also communicated recently with Nuclear Regulatory Commission (NRC) staff members on the current surety arrangements the NRC and agreement states have in place for reclamation at Title II sites. The current NRC staff estimate for Title II sites is on the order of $210 million, largely based on preliminary reclamation cost estimates prepared by the licensees as part of their site reclamation plan. The licensees' reclamation estimate is for construction only and does not include cost for such items as engineering, site and tailings characterization, environmental impact analysis, and project and construction management. These items are included in the Department's estimate because we understand the licensees include these costs as part of their on-going site operating cost and not part of the site reclamation cost.

The NRC is in the process of reviewing the reclamation plans to ensure the plans meet Environmental Protection Agency standards for the 86 million tons of tailings located in New Mexico. This represents approximately one-half of the total

Answer 12 (continued):

volume of Title II tailings to be stabilized. In 1986, the State requested the NRC to assume regulatory authority for the sites. Previously, the reclamation plans and costs were based on meeting State standards. It is reasonable to assume that the reclamation plans for the New Mexico sites will be revised and this may lead to an increase in the surety requirements. Updated surety arrangements at a majority of the sites should exist in about 1 year.

Reclamation plans for the Title II sites, as a result of several years of on-going operations, surveillance and maintenance, consist primarily of re-arrangement or re-contouring of the tailings piles followed by placing a radon gas and erosion barrier. Construction activities for Title II sites are generally not as extensive as for the inactive Title I sites the Department of Energy is responsible for.

Finally, actual reclamation experience on Title II sites is very limited. The Edgemont site is currently being remediated and the tailings relocated about 2 miles from the site. We understand that reclamation at this site is about $10 per dry ton. Later this year a detailed estimate is to be prepared for the Uravan site.

Answer 12 (continued): In conclusion, it is our expectation that the disparity between the Department's cost estimate and the surety arrangements would be significantly reduced after: (1) an allowance is made for differences between the scopes of work included in the estimates prepared by the two agencies; (2) the New Mexico sites have NRC-approved reclamation plans; and (3) allowances are made for differences on construction complexity between the Title I and Title II sites.

QUESTIONS FROM SENATOR BUMPERS

Question 13: Do we have adequate supplies of domestic uranium for national security uses - fueling our nuclear submarines and producing nuclear weapons? Will we have adequate supplies in the future, i.e., ten, twenty, or fifty years hence? If not, what percentage of our military uranium needs will have to be met with imports? Does the Administration consider the necessity of importing uranium for military uses a national security problem?

Answer: Based on current projections of future national security uses and the current status of DOE's enriched, natural and depleted uranium inventories, it is unlikely that DOE will have to purchase any uranium through at least the year 2000. In the event that uranium is needed after that period, we believe it likely that there will be adequate resources to assure that domestic supplies are available to eliminate any need for relying on imports for meeting future military requirements. Accordingly, we do not consider the importation of uranium, per se, to pose a serious threat to national security.

QUESTIONS FROM SENATOR BUMPERS

Question 14: Would a fifty percent import restriction have a positive or negative impact on national security?

Answer: Current EIA estimates show that less than 60 percent of future domestic uranium requirements will be satisfied from imports. If a 50 percent import restriction is imposed, domestic consumption will increase by less than 10 percent in the short-run. We do not believe that this difference will significantly impact national security.

QUESTIONS FROM SENATOR BUMPERS

Question 15: An MIT study quoted in a New York Times editorial on September 25, 1986, estimated that uranium prices would double and that electricity cost would increase by up to $800 million over five years. Is this a reasonable estimate? Under DOE's or EIA's calculations, how much would the price of domestic uranium rise under a fifty percent import restriction? What would the total cost increase be for U.S. nuclear utilities and their customers?

Answer: The Department is not familiar with the analysis cited in the referenced article. We have not made such an analysis ourselves. We will attempt to contact the MIT authors and review their analysis. Assuming we are successful, we will provide a response as soon as possible but cannot do so at this time.

QUESTIONS FROM SENATOR BUMPERS

Question 16: What impact would an import restriction have on the ability of DOE's enrichment program to be competitive in the world market?

Answer: If legislative restrictions were placed on the importation of uranium for domestic end-use, it would not impact the uranium enrichment enterprise, because utilities would not be able to avoid the restriction by obtaining both their enrichment and uranium overseas. A court ordered import restriction on enrichment of foreign-source uranium, on the other hand, would have a very negative impact on the enrichment enterprise. Such a restriction would have to be enforced through the DOE enrichment contracts. The existing contracts do not contain a provision to allow us to impose such a restriction. Utilities could avoid an uranium import restriction, enforceable only through restrictions on enrichment services, by buying both their uranium and their enrichment services overseas. The Nuclear Assurance Corporation made a study of such a possibility and they estimate that DOE could lose 43 percent of expected sales from 1987-2000 assuming a 100 percent import restriction. For a 50 percent restriction, expected sales losses could be about 21 percent of DOE's expected total sales. This would amount to about $3 billion.

QUESTIONS FROM SENATOR BINGAMAN

Question 17(a): DOE some years ago surveyed the kinds of supports Canada and other countries afford their uranium industry -- the so-called Patterson report. Could you supply a copy for the record, along with any update, if not today, by Thursday noon?

Answer: Attached is a copy of a February 23, 1981, report entitled "The Domestic Uranium Industry and Imports of Uranium," sometimes referred to as the Patterson report. The report was updated in August 1982 and supplied to the Committee on September 2, 1982. A copy of the updated report, entitled "Status of the U.S. Uranium Industry," is attached.

THE DOMESTIC URANIUM INDUSTRY AND
IMPORTS OF URANIUM

FEBRUARY 23, 1981

Division of Resource Assessment Operations
Office of Uranium Resources and Enrichment

U.S. DEPARTMENT OF ENERGY

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THE DOMESTIC URANIUM INDUSTRY AND IMPORTS OF URANIUM

SUMMARY

To assess the health of the U.S. uranium industry for this study, a review was made of certain key measures: uranium reserves, exploration, production, employment, productivity investment, and revenues. While some of these factors are at historically high, if not record, levels, reductions are taking place. In the case of employment, significant declines since 1978 are evident. Substantial productive capacity exists in terms of resources and mine-mill capacity, but the associated costs appear to be high, particularly compared to major low-cost operations overseas. In the long run, there appears to be a substantial market for uranium. For the time period 1980-1985, substantial delivery commitments are under contract. The potential for additional contracts, according to data from buyers, is limited. It is now evident that the available domestic and foreign supplies for the 1980-1985 period is greater than the needs for those years. This situation is reflected in the occurrence of a significant drop in spot prices for uranium.

Under such circumstances, foreign uranium is viewed with concern even though foreign deliveries to DOE enrichment plants have been much less than the allowable limits. Uranium needs overseas are also less than the supply. In addition, a number of low-cost foreign deposits have been discovered in recent years. In particular, Australia and Canada are potential sources of additional low cost uranium that could seek a market in the United States. Development and export policies of these countries could, however, limit the actual availability and prices in the United States of uranium from these sources. Also, there is a degree of risk that future deliveries from foreign sources will not be made, due to political and other uncertainties. In any case, the amount of available uncommitted market in the U.S. is comparatively small for the next few years or so.

In summary, foreign uranium usage has been limited. While excess foreign, low cost uranium is a potential threat; exporter country controls and U.S. buyer preference for U.S. uranium, coupled with a limited future additional U.S. market, reduce the actual threat involved. The problems of the U.S. industry currently are related more directly to lack of domestic demands and falling prices, rather than the use of foreign uranium. The plan for removal of restrictions on foreign uranium has worked well. There does not appear to be any current need for any changes to the plan. However, the state of the domestic industry and the impact of imports should continue to be monitored.

BACKGROUND

The domestic uranium mining industry has been protected historically by preventing or limiting the use of imported uranium for domestic end-use. The statutory basis for this protection appears in Section 161v of the Atomic Energy Act of 1954 as amended (Public Law 88-489), which provides:

> "...That the Commission, to the extent necessary to assure the maintenance of a viable domestic industry, shall not offer such services for source or special nuclear materials of foreign origin, intended for use in a utilization facility

> within or under the jurisdiction of the United States. The Commission shall establish criteria in writing setting forth the terms and conditions under which services provided under this subsection shall be made available including the extent to which such services will be made available for source or special nuclear material of foreign origin intended for use in a utilization facility within or under the jurisdiction of the United States."

This section of the Act was established in 1964 at a time of limited uranium demand for the commercial market, excess foreign supply, low uranium prices, and forecasts of high future requirements for uranium. The effect was a complete embargo on use of foreign uranium for domestic end use. When it appeared that restrictions on foreign uranium could be eased without affecting the viability of the uranium industry, the Atomic Energy Commission (AEC), after careful study and Congressional review, put into effect a plan for gradual removal of restrictions on enrichment of imported uranium for domestic end-use. The plan, which was announced in 1974, provided that in 1977 up to 10 percent of uranium furnished by a toll enrichment customer for domestic end-use could be of foreign origin. The amount would be increased to 15 percent in 1978, 20 percent in 1979, 30 percent in 1980, 40 percent in 1981, 60 percent in 1982, and 80 percent in 1983. Starting in 1984 there would be no restrictions.

The AEC announcement also stated:

> "It is not anticipated that any change will be required in the schedule now being established. However, the AEC will monitor the extent of importation of foreign uranium for domestic use and its effect on the viability of the domestic uranium producing industry and on the President's objective of achieving a national capability for energy self-sufficiency. For this purpose the Commission, in addition to continuing its present program of monitoring uranium exploration activity, resource development, production capability and the general uranium market situation, will also monitor purchase or other arrangements involving import of any material destined for enrichment in private enriching facilities. If the extent of domestic use of foreign uranium should impair or threaten to impair the common defense and security, the Commission will institute such measures as are deemed necessary."

The basis for this stepwise removal of restrictions was that the expanding requirements for uranium, both in the United States and in foreign markets, would by the late 1970's absorb a higher percentage of the world uranium production capability, and there would, therefore, be only limited quantities of low-cost uranium seeking a market in the United States. It was also judged that the U.S. industry would continue to be substantially competitive with foreign production. Also, the anticipated preference of United States uranium buyers for uranium of domestic origin and the application of the percentage limitation to individual companies, rather than as an industry-wide limitation, would tend to hold down the actual use of foreign uranium.

Recently there has been a substantial drop in spot prices for uranium, reflecting reduced forecasts of uranium requirements and rising supplies and production capacity. As a result, some U.S. producers have announced production cutbacks, layoffs, or delays in expansions. These events have created anxiety about the health of the domestic uranium mining industry and the possible adverse effects resulting from importation of foreign uranium. Responding to these concerns, Senator Domenici has proposed legislation to prevent the Department of Energy (DOE) from enriching "feed material furnished by the enrichment customer which is intended to be used in a domestic utilization facility where the fraction of feed material furnished by the enrichment customer, which is foreign origin, exceeds 10 percent." However, enrichment contracts signed prior to October 1, 1980, were to be exempted from this restriction. DOE, as part of its statutory mission, is continually monitoring the viability of the uranium mining industry, and at Senator Domenici's request has undertaken this study of the potential impact of imported foreign uranium on U.S. producing companies.

The legislation establishing the restriction of Section 161v and subsequent AEC analysis of the problem did not result in a definition of "viability." It was, in effect, judged that appropriate criteria for viability might change from time to time and a rigid definition would not necessarily be helpful. A number of factors must be examined to consider the viability question. This study reviews the health of the domestic uranium mining industry, the market outlook, foreign supply and demand, and considers our experience in controlling the use of foreign uranium in the United States. Some possible options for reducing the potential adverse effects of importing foreign uranium are also examined.

Information used in this study is primarily from existing and newly developed data of DOE. Certain information developed by the Nuclear Assurance Corporation and the Nuclear Exchange Corporation were also utilized. An ad hoc group of the Mining and Milling Committee of the Atomic Industrial Forum reviewed and commented on the technical information regarding the status of both the domestic and foreign industries.

DOMESTIC URANIUM MINING INDUSTRY

Uranium Resource Estimates

The results of a reassessment of U.S. uranium resources, accomplished as part of DOE's National Uranium Resource Evaluation (NURE), were published in October 1980 (GJO-111(80)). A summary of these resource estimates at forward costs (not prices) ranging from \$15 to \$100 per pound U_3O_8 is shown in Figure 1. Uranium resources in the U.S. are now at the highest point in our history, but much of the resources will be available only at higher than current uranium prices of \$25 to \$30 per pound.

Reserves are in well-defined portions of ore deposits. Probable potential resources are in extensions to known deposits, or well-defined mineral trends. Possible potential resources are in identified favorable geologic areas within productive geologic formations and provinces, that is, ones that contain reserves or past production totaling 10 tons U_3O_8, or more. Speculative resources are in identified favorable areas that have not been productive to date.

Figure 1: URANIUM RESOURCES OF THE UNITED STATES[1]

Reserves as of January 1, 1980
Other Resources as of October 1, 1980
Tons U_3O_8
Probability distribution values

Forward-cost category	Mean	95th percentile[2]	5th percentile[2]
$15/lb U_3O_8			
Reserves	225,000	190,000[3]	260,000[3]
Probable	295,000	185,000	448,000
Possible	87,000	42,000	156,000
Speculative	74,000	30,000	162,000
Totals	681,000	447,000	1,026,000
$30/lb U_3O_8[4]			
Reserves	645,000	567,000	729,000
Probable	885,000	659,000	1,161,000
Possible	346,000	194,000	530,000
Speculative	311,000	155,000	600,000
Totals	2,187,000	1,731,000	2,748,000
$50/lb U_3O_8[4]			
Reserves	936,000	821,000	1,060,000
Probable	1,426,000	1,102,000	1,802,000
Possible	641,000	346,000	973,000
Speculative	482,000	251,000	890,000
Totals	3,485,000	2,771,000	4,313,000
$100/lb U_3O_8[4]			
Reserves	1,122,000	971,000	1,291,000
Probable	2,080,000	1,646,000	2,573,000
Possible	1,005,000	521,000	1,526,000
Speculative	696,000	378,000	1,225,000
Totals	4,903,000	3,875,000	6,056,000

[1] Uranium resources are estimated quantities recoverable by mining. Losses due to processing may range from 5 to 15 percent.

[2] The 95th percentile indicates a 95-percent confidence in the existence of at least the amounts shown. The 5th percentile indicates a 5-percent chance of the existence of more than the amounts shown. The values for resources at the 95th and 5th percentiles are not directly additive.

[3] The $15 category was added for purposes of this study. Confidence limits are based on an estimated ±15% confidence range.

[4] Includes lower cost resource categories.

Resources are expressed in terms of "forward costs," which are the operating and capital costs that would be incurred in the production of the uranium. Expenditures prior to the time of the resource estimate are excluded. Such cost levels should not be confused with prices or full costs, including a return on investment, which can range from 1.3 to 1.7 times the forward cost.

For the purpose of this study, the critical estimates, considering current prices, are the reserves available in the \$15 and \$30/lb U_3O_8, or less, forward cost categories. During 1979 \$15 reserves were reduced by 18 percent and \$30 reserves by 10 percent, primarily as a result of rapidly rising costs. Reductions of \$15 cost reserves have been occurring annually since 1976. Since each higher cost category includes all lower cost material, such reductions do not imply a loss of uranium-bearing material, but that the material is available only at higher costs. This may severely limit their availability in today's marketplace. Most of the uranium resources are located in a few areas in the Colorado Plateau of New Mexico, Arizona, Colorado, and Utah; in the Wyoming Basins; and in the Texas Gulf Coastal Plain. It should be noted that the reserve estimates in Figure 1 were as of January 1, 1980, and the lower cost reserves have undoubtedly decreased since that date because of rising costs.

Uranium Exploration Activities

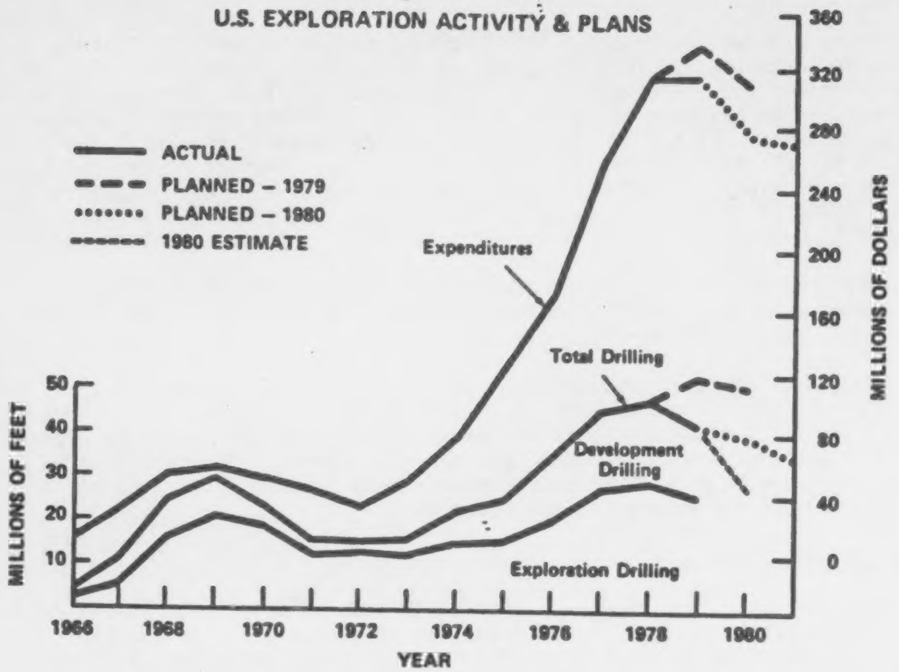
Uranium exploration in the United States reached its all time high in 1978 as measured by the principal exploration indicator, surface drilling. Data provided to DOE by the exploration companies indicated a total of 48 million feet of drilling in 1978. In 1979, however, drilling declined to 41 million feet, and during 1980 the downward trend hastened, with drilling estimated to be approximately 28 million feet for the year (see Figure 2).

Other exploration indicators have also been declining. Exploration expenditures in 1980 are estimated at \$277 million -- a decrease of about 12 percent from 1979 (see Figures 2 and 8). These reductions indicate less confidence in the future growth of uranium markets.

Annual gross additions to reserves, a measure of exploration success, have been at high levels for the higher cost, i.e. \$30 and \$50 per pound U_3O_8 categories, but have been decreasing for the lower cost levels. Costs have increased significantly in recent years raising the quality of resources needed to produce at a given cost level and reducing the quantities available at that level. For example, in 1979 only 1,000 tons were added to \$15 cost reserves, but reevaluation, largely because of inflation, caused the removal of 52,000 tons and production depleted the \$15 reserves by an additional 14,000 tons. Hence, in 1979 \$15 reserves decreased from 290,000 to 225,000 tons. This trend continued in 1980. On the other hand, in 1979 some 93,000 tons were added to \$50 reserves and 77,000 tons removed for a net increase of 16,000 tons U_3O_8. Thus, while exploration success has been good, the costs of producing the resources found are high in comparison with current prices and concurrently the cost of producing previously found resources has also increased.

Figure 2

U.S. EXPLORATION ACTIVITY & PLANS



The sharp rise in exploration resulted from the increase in prices in the 1974 to 1976 period, the active procurement activity of utilities, and the optimistic projections of future growth in uranium demand. Many new companies became active in exploration. Over 150 companies were involved in exploration in 1979. Considering the drop in requirements projections, the level of activity reached probably was in excess of real needs. Therefore, some reduction of effort more in line with future needs is not detrimental. However, if the level of activity continues to fall over the next few years, the exploration activity may not be adequate to assure that the U.S. would be able to meet long-term needs largely from domestic sources.

For several years the growth of uranium exploration by foreign companies in the U.S. was paralleled by the growth of uranium exploration by U.S. companies abroad. However, in 1979 there was a reversal with increases in effort of U.S. companies in other countries, while there were decreases by foreign companies in the U.S. Foreign uranium exploration in the U.S. in 1979 amounted to $34.1 million or about 11 percent of total exploration expenditures, a decrease from the 13 percent in 1978. On the other hand, twenty-four U.S. companies reported spending over $43 million in 1979 for uranium exploration in foreign countries, or 20 percent more than in 1978. The increase in foreign exploration by U.S. companies, coupled with decreases at home, indicates an increasing preference for exploration outside of the U.S. This reflects success in finding attractive deposits, particularly in Canada and Australia, and increasing difficulties in conducting exploration in the U.S.

Uranium Production

Domestic uranium production in 1980 is expected to be over 21,000 tons U_3O_8 in concentrate. This represents a 15 percent increase over 1979 and is the highest U.S. production level for any single year. Production in recent months has been at record rates; the equivalent to over 22,000 tons U_3O_8 per year. This production comes from conventional mine-mill operations as well as nonconventional sources, such as solution mining and byproduct recovery from processing of other minerals. The high production levels are in response to sales contracts made some time ago. Buyers are actually receiving uranium in excess of their currently scheduled needs.

Several new uranium processing facilities are under construction, or planned, which could bring the total national capacity to around 30,000 tons per year by the mid-1980's.

Despite the increases in ore throughput and uranium production in 1980, a widespread curtailment of uranium mining and milling activities is underway. Production at some operating mines has been reduced and some planned mill expansions and construction are being postponed. The reduction in mine output will not be reflected in decreased uranium production until mine and mill ore stockpiles are reduced.

U.S. Production Capability

A study has been carried out of attainable uranium production levels from uranium reserves in the United States and related costs. In addition, existing commitments for sale of uranium have been subtracted in order to estimate the quantity of potential future production which is currently uncommitted to sale and is, therefore, available to meet unfilled uranium requirements for future nuclear power growth. The uranium production capability projections should not be construed as being estimates of actual future supply, but simply as potential production which may be available to meet whatever demand eventually exists.

Using the "production center" concept, U.S. uranium production capability has been projected from ore reserves estimated as of January 1980 to be available at forward costs of $30 per pound U_3O_8, or less. The production centers consist of operating (Class 1), committed (Class 2), or planned (Class 3) uranium extraction and processing facilities. No potential resources were utilized. Seventy production centers have been identified, including conventional mills supplied by open pit and/or underground mines; solution mining and heap-leach operations; and operations where uranium is recovered as a byproduct of phosphate, copper, and beryllium mining and processing activities. Many of the production centers include several types of operations.

Projections are based primarily on operating conditions -- average ore grades, mill recoveries, and operating and capital costs -- similar to those currently prevalent in the uranium mining and milling industry. Specific information on company plans, costs, and operating methods has been incorporated.

Forward capital and operating costs have been estimated for production from each major uranium deposit (or groups of small deposits) included in a given production center. For existing operations, direct mining and milling costs are included along with applicable on-going development costs.

Figure 3 shows the total projected production capability categorized by forward production costs. Projected uranium demand and current sales commitments are also shown. Domestic demand is based on the DOE's Office of Uranium Resources and Enrichment 1980 mid-case nuclear power growth projection, assuming no reprocessing and a 0.20% U-235 enrichment tails assay. Sales commitments include sales to U.S. and foreign buyers, based on data available as of January 1, 1980.

Committed sales by each producer have then been subtracted. The remaining production (over sales commitments) categorized by forward production costs is compared to unfilled requirements reported to DOE by buyers as of January 1, 1980 (Figure 4). Thus, these centers would have the capability of meeting U.S. unfilled needs from $30 ore reserves.

As will be seen subsequently in the section dealing with foreign production capability and demand, an excess of foreign capability also exists. The costs of production for the uncommitted foreign capacity are estimated to be very competitive with the costs projected for the U.S. There is expected to be sufficient uncommitted foreign capacity at costs below the $30 per pound level to fill a substantial portion of unfilled U.S. demand. Therefore, adequate domestic or foreign capacity could be available, but the foreign capacity would have lower production costs.

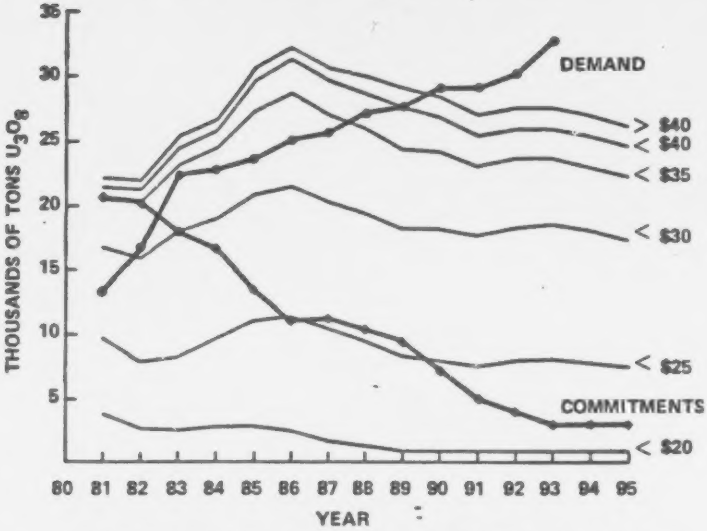
Industry Characterization

For the purpose of domestic uranium industry characterization companies have been subdivided into three classes. "Class 1" companies are currently involved in operating uranium producing facilities with adequate supporting resources. "Class 2" companies have made commitments to develop mines or construct processing facilities. "Class 3" companies have a sufficient amount of reserves to currently justify construction of production facilities, but have not yet made a commitment to construct. Companies have been further characterized by the major type of company activity or source of revenue. Categories include Oil and Gas (OG), Mining (MG), Conglomerate (CO), and Utility (UT). The mix of companies has changed over the last decade as new companies entered the uranium business in response to increasing prices and prospects for expanding markets.

Figure 5 provides a listing and profile of companies involved in uranium resource development and production. Where appropriate their parent organizations have been identified. Also indicated are the gross sales for the companies, i.e. open pit mining (OP), underground mining (UG), in situ leaching (SL), or byproduct of phosphoric acid or copper production (BY). Certain companies have announced cutbacks in their uranium operations, generally in exploration or mining activity. Such companies are also noted in Figure 5. A number of companies in the uranium business are also involved in foreign uranium activities, or in other domestic or foreign activities, as shown in Figure 5.

Figure 3

U.S. PRODUCTION CAPABILITY BY FORWARD COST/LB U_3O_8
CLASSES 1 THRU 3 (RESERVES ONLY)



URANIUM DEMAND BASED ON JULY 1980 DOE/URE MID CASE NUCLEAR POWER GROWTH PROJECTION AT 0.20% ENRICHMENT TAILS ASSAY

Figure 4

U.S. PRODUCTION CAPABILITY BY FORWARD COST/LB U_3O_8
CLASSES 1 THRU 3 UNCOMMITTED (RESERVES ONLY)

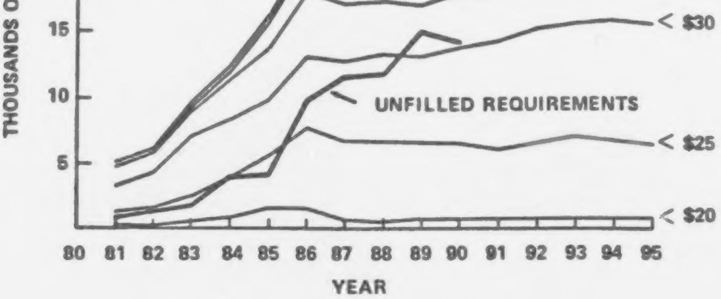


Figure 5: U.S. URANIUM COMPANY PROFILE

Class 1 COMPANY NAME	Type	Gross Sales (Millions $) 1/	Uranium Sales Value (Millions $) 1/	Type of Operation	Cutback Announced	Foreign Uranium Operations	Other Operations	
							Domestic	Foreign
ARCO (Also Class 2) (Anaconda Copper Co.)	OG	>1,000	>50	OP, UG	X		X	X
Atlas Minerals Corp.	MG	>10	>10	UG			X	X
Chevron (Chevron Resources Co.)	OG	>1,000	>10	OP			X	X
Cobb Nuclear	MG	<10	<10	UG				
CONOCO (Also Class 2, 3)	OG	>1,000	>10	OP	X	X	X	X
Commonwealth Edison (Cotter Corp.)	UT	>1,000	>10	UG		X	X	
Dawn Mining Co. (Newmont Mining Corp.)	MG	>100	<10	OP			X	X
Energy Fuels Nuclear, Inc.	MG	>10	0	UG				
Everett Minerals Corp.	MG	<10	<10	SL				
Exxon Corp. (Also Class 3)	OG	>1,000	>100	OP		X	X	X
Federal Resources Corp. (Federal-American Partners) (Madawaska Mines Ltd., Canada)	MG	>10	>10	OP	X	X	X	X
Freeport Minerals Co. (Freeport Uranium Recovery Corp.)	MG	>100	<10	BY			X	X
Gardinier, Inc.	MG	>100	<10	BY		X	X	X
General Electric/Utah International, Inc. (Pathfinder Mines Corp.)	CO	>1,000	>10	UG, OP	X	X	X	X
Getty Oil Co. (Petrotomics)	OG	>1,000	>10	OP		X	X	X
Gulf Oil (Also Class 2)	OG	>1,000	>10	UG		X	X	X
Homestake Mining (Also Class 2)	MG	>100	>10	UG		X	X	X
International Energy Co.	MG	<10	<10	SL				
Kerr-McGee Corp. (Also Class 3)	OG	>1,000	>100	UG, OP	X		X	X
Mobil Corp. (Also Class 2)	OG	>1,000	<10	SL			X	X
New Mexico and Arizona Land Co.	MG	<10	<10	UG			X	
Niagara Mohawk	UT	>100	>10	SL				
Pioneer Corp. (Also Class 3)	OG	>100	<10	OP			X	

1/ 1979

Class 1 COMPANY NAME	Type	1/ Gross Sales (Millions $)	1/ Uranium Sales Value (Millions $)	Type of Operation	Cutback Announced	Foreign Uranium Operations	Other Operations	
							Domestic	Foreign
Ranchers Exploration and Development Corp.	CO	>10	>10	UG		X	X	X
Reserve Oil and Min.	MG	>10	>10	OP				
Rio Tinto Zinc/ Rio Algom, Ltd. (Rio Algom Mines, Ltd.)	MG	>1,000	>10	UG		X	X	X
Union Pacific Corp. Rocky Mtn. Energy Co. (Also Class 3) (Bear Creek Uranium Co.)	CO	>1,000	<10	OP			X	
Standard Oil Co. (SOHIO)	OG	>1,000	<10	OP			X	X
Solution Engineering, Inc.	MG	<10	<10	SL				
Southern California Edison	UT	>1,000	<10	OP			X	
UNC Resources (including co. for UNC)	CO	>100	>50	UG	X	X	X	X
Union Carbide Corp.	CO	>1,000	>50	OP, UG	X	X	X	X
Union Oil Co. (Also Class 3)	OG	>1,000	0	OP			X	X
Uranium Resources, Inc.	MG	<10	<10	SL		X		
U.S. Steel Corp.	CO	>1,000	>10	SL		X	X	X
Phelps Dodge (Western Nuc., Inc.)	MG	>1,000	>10	OP, UG	X	X	X	X
Westinghouse Elec. Corp. (Also Class 2, 3)(Westinghouse Electric Corp.)	CO	>1,000	>10	BY		X	X	X
Totals - OG	11	>1,000- 15	>100 - 2	OP - 12	3	4	11	10
MG	16	>100 - 7	>50 - 3	UG - 10	2	6	9	8
CO	7	>10 - 5	>10 - 16	UG,OP - 5	3	6	7	6
UT	3	<10 - 6	<10 - 12	BY - 3	0	1	2	0
			0 - 4	SL - 7				
	37	37	37	37	8	17	29	24

1/ 1979

Class 2 COMPANY NAME	Type	Gross Sales 1/ (Millions $)	Uranium Sales Value 1/ (Millions $)	Type of Operation	Cutback Announced	Foreign Uranium Operations	Other Operations Domestic	Other Operations Foreign
Amax Mining Co.	MG	>100		BY			X	X
Bokum Resources Corp.	MG	>10		UG	X			
Standard Oil of Indiana-Amoco (Cyprus Mines Corp.)	OG	>1,000		OP	X		X	X
Earth Sciences, Inc. (Earth Sciences, Ltd.)	MG	<10		BY				X
International Minerals and Chemical Corp.	MG	>1,000		BY			X	X
Nuclear Development Co.	MG	<10		SL				
Nuclear Dynamics, Inc.	MG	<10		SL				
Phillips Petroleum Co.	OG	>1,000		UG			X	X
Consumer Power (Plateau Resources, Ltd)	UT	>1,000		UG			X	
Power Resources Corp.	MG	<10		SL				
Simplot Co.	MG	>10		BY			X	
Sunoco Energy Development Co.	OG	>1,000		SL			X	X
Tennessee Valley Authority	UT	>1,000		OP, UG	X		X	
Totals - OG MG CO UT	3 8 0 2	>1,000 - 6 >100 - 1 >10 - 2 <10 - 4		OP - 1 OP, UG - 1 UG - 3 SL - 4 BY - 4			3 3 0 2	3 3 0 0
	13	13		13	3		8	6
Class 3 COMPANY NAME								
Cleveland-Cliffs	CO	>1,000					X	X

1/ 1979

The uranium industry involves a diverse group of company types. Oil and gas companies now play a large role in the industry. Eleven of the 37 Class 1 companies are oil and gas companies. Nineteen of the Class 1 companies are large, having revenues of over one billion dollars per year. The uranium operations of such companies, however, are only a small part of their total business and uranium has to compete with other corporate activities.

A further generalization can be made regarding the companies' spheres of operations. Seventeen of the 37 Class 1 companies are also involved in foreign uranium activities, primarily exploration. The remaining 20 conduct uranium operations only in the U.S. Of these, nine are involved in foreign activities other than uranium.

There are, in addition to the companies listed in Figure 5, a number of smaller, independent operations that mine and sell ore. During 1979 there were 111 independent producers mining and selling uranium ores to mills or buying stations from 362 small uranium mines. The total production from these operations was 400,000 tons of ore, comprising a little over 2 percent of total uranium ore production for the year. The ten largest of these independent operations produced 290,000 tons of ore in 1979.

Employment

As a measure of industry viability and actions in the current situation, the employment situation was reviewed. Total uranium industry employment (Figure 6) has been about 22,000 people, largely in the states of New Mexico, Wyoming, Texas, Colorado, and Utah. This is sharply higher than levels of a few years ago. However, based on a preliminary DOE survey of the industry, it is estimated that during 1980 there was a layoff of at least 4,000 workers in the uranium industry. In some of the states where reductions in uranium industry employment are taking place, there have been increases in employment in other mineral fuel activities, such as coal, oil, and gas. This growth will allow absorption of displaced uranium workers, at least in some of the effected uranium areas.

Employment in activities directly associated with uranium exploration, as shown in Figure 6, increased from 1,600 in 1973 to a peak of 4,500 in 1978, and then dropped to 4,100 in 1979. Employment in uranium mining rose steadily from about 3,500 workers in 1973 to 14,200 in 1979. Employment in milling activity increased from 1,500 in 1973 to 3,600 in 1978.

Figure 6: EMPLOYMENT IN THE URANIUM INDUSTRY

	1973	1974	1975	1976	1977	1978	1979
Exploration	1,557	1,697	2,049	2,793	4,140	4,449	4,066
Mining	3,516	3,928	5,386	7,603	11,453	13,338	14,219
Milling	1,522	1,668	2,237	2,727	3,175	3,615	3,476
Total	6,595	7,293	9,672	13,123	18,768	21,402	21,761

Productivity

Uranium production in the period 1973-1979 has been related to available data on employment statistics to obtain a measure of productivity, which is significant in terms of the domestic industry's costs and its ability to compete with foreign supply. Productivity estimated from the standpoint of tons of ore mined and processed is a measure of the efficiency of the manpower force. With respect to tons U_3O_8 produced, however, productivity is also a function of the grades of ore mined and processed, as well as the recovery efficiency of the uranium mills.

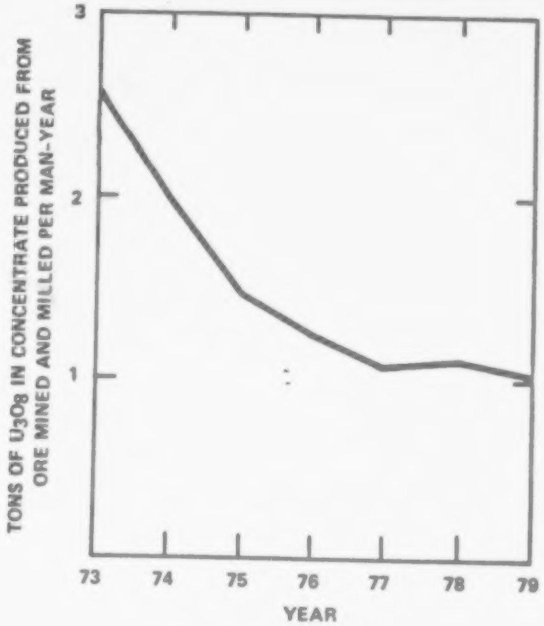
Overall mining productivity, in thousands of tons of ore per man-year, dropped from a little over 1.8 to about 1.0 from 1973 through 1977, then rose to about 1.2 thousands of tons per man-year in 1978 and 1979. The overall decrease through 1979 was about 35 percent.

The decrease of mining productivity through 1977, in terms of tons of ore produced per man-year, was apparently the result of increasing depths of open pit mining, a sharp increase in inexperienced miners, and the additional training required. There has also been a relative increase in supporting technical and staff personnel needed to handle increased Federal and State environmental, health and safety regulations.

Overall milling productivity, in terms of tons of ore fed to process, decreased from 4.5 thousand tons per man-year in 1973 to 3.3 thousand in 1976, but then rose to 5 thousand in 1979 for an overall increase of over 10 percent from 1973 to 1979. The increase in the years following 1976 is due in large part to the coming on-stream of newer, more efficient mills, and expansions of some existing mills.

Considering the tons U_3O_8 in concentrate actually produced from mined and processed ore, which also reflects the reducing grade of ores processed, the overall productivity of the uranium industry declined from 2.6 to 1.1 tons U_3O_8 produced per man-year from 1973 through 1977. During the 1977-1979 period, overall productivity stabilized at around 1.1 tons U_3O_8 per man-year (Figure 7).

Figure 7
PRODUCTIVITY OF U.S. URANIUM INDUSTRY
(TOTAL MINING PLUS MILLING PERSONNEL)



A continuing loss of productivity may be expected, considering recent trends. There are no identified technological improvements or changes in the natural resource base that can be expected to materially improve the situation. The state of technology of the uranium mining and milling industry is currently quite advanced. Further improvements are likely, but with marginal effects. Similarly, only minor improvements would be possible from use of larger production units, as economics of scale have already largely been realized with current plants.

Industry Capital Investment

During the latter part of the 1970's there was a steady and substantial increase in the uranium industry's capital expenditures for exploration and for mining and milling facilities, reaching the $800 million level in 1979. Expenditures for 1980 were planned to increase to $876 million, although a reduction in exploration was planned. These values and trends are obscured by inflation so the pre-1980 expenditures are also expressed in 1980 dollars in Figure 8 below. The planned expenditures for mine and mill facilities continue to show increases. Some of the capital expenditures, particularly for milling, relate to environmental projects. These increases have probably been influenced by the carrying out of earlier commitments to construct plants and to deliver uranium. They may also reflect the inherent inflexibility associated with construction start or stop decisions. It is likely that revisions to these plans have been made. Details of industry capital expenditures are shown in Figure 8.

Figure 8: URANIUM INDUSTRY CAPITAL EXPENDITURES (MILLIONS OF DOLLARS)

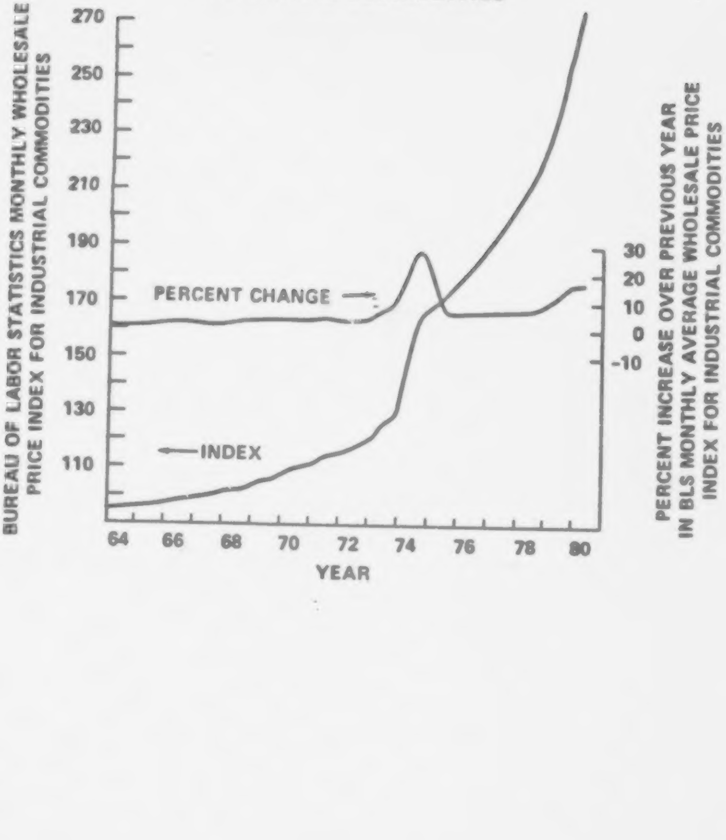
	Actual Dollars (1980 Dollars in Parenthesis)					Planned 1/	
	1975	1976	1977	1978	1979	1980	1981
Exploration	122(172)	171(228)	258(325)	314(351)	316(341)	277	271
Mine	124(174)	200(265)	325(410)	271(303)	282(305)	350	317
Mill	22(31)	55(74)	167(211)	156(174)	203(219)	249	242
Totals	268(377)	426(570)	750(946)	741(828)	801(865)	876	830

1/ As of early 1980.

Cost Increases

Over the last several years the cost of producing uranium in the U.S. has increased considerably. One indicator of rising costs is the Wholesale Price Index for Industrial Commodities. As shown in Figure 9, from 1973 to 1980 costs have more than doubled. In view of decreasing productivity, lower ore grades, and increased health and safety regulations, uranium production costs probably have increased even more rapidly.

Figure 9
WHOLESALE PRICE INDEX
INDUSTRIAL COMMODITIES



Industry Revenues

A rough measure of the value of sales commitments of U.S. producers as of mid-1980 can be obtained by assuming deliveries will be at the reported average contract sales prices for uranium committed to domestic buyers. On this basis, it is estimated that revenues were close to a billion dollars in 1979 and over a billion in 1980. Revenue from existing sales contracts will continue to exceed a billion over the next five years as shown in Figure 10. The values will be subject to change pending developments in contracting and settlements of market price contracts involved.

Figure 10: U.S. URANIUM PRODUCER REVENUES

	U.S. Producers Sales Commitments Tons U_3O_8				
	Domestic	Foreign	Total	Contract Sales Price 1/ $/lb U_3O_8	Revenues 1/ $Millions
1979	16,500	3,100	19,600	23.85	935
1980	20,800	2,000	22,800	26.00	1,186
1981	18,600	1,000	19,600	28.20	1,125
1982	18,700	1,000	19,700	34.80	1,371
1983	17,300	900	18,200	41.40	1,507
1984	15,700	500	16,200	43.45	1,408
1985	13,700	500	14,200	43.45	1,234

1/ Year of delivery dollars

MARKET OUTLOOK

Requirements

The outlook for uranium requirements is closely related to the growth of nuclear power. On December 1, 1980, there were 75 nuclear power reactors licensed to operate in the U.S., concentrated mostly in the East and Midwest. These plants have an electrical generating capacity of 55 Gigawatts (GWe). In addition to operating plants, there are under construction 86 plants with a total rated capacity of 95 GWe. Some of the plants are at such an early construction stage that they may be deferred or cancelled completely. An additional 17 reactors with 20 GWe capacity are on order. Together the group aggregates 170 GWe of capacity. However, the future for some of the ordered reactors is questionable.

Latest mid-case projections of nuclear power growth by the DOE's Office of Uranium Resources and Enrichment (URE) and the Energy Information Administration (EIA), in Figure 11, show an increase in nuclear power licensed to operate from 55 GWe at the end of 1980 to 96 GWe in 1985, 129 GWe in 1990, 155 GWe in 1995, and 180 GWe in 2000. EIA also projected a low case of 160 GWe and a high case of 200 GWe in 2000.

There are alternative views on U.S. nuclear power growth. The DOE's Office of Planning and Analysis has projected nuclear growth to the year 1990 at 125 GWe and to the year 2000 at 150 GWe, based on historic delays to nuclear power growth. The DOE Office of the Assistant Secretary of Nuclear Energy has projected 400 GWe, based on energy demand growth, nuclear competitiveness, and industry construction capability. All of these values are sharply reduced from the projected growth of the nuclear industry of just a few years ago. For example, in 1976 U.S. nuclear capacity in the year 2000 had been projected to be 500 GWe, and in 1978 it was projected to be 320 GWe.

Even at the more conservative estimates, nuclear capacity still is expected to expand substantially and to provide a significant portion of future domestic electric capacity. Current methods of projecting nuclear growth and uranium requirements are based on estimates of reactor startup dates, considering construction and licensing times and systems power requirements. Accurate forecasts have proven to be difficult. Newer forecasting methods employing probabilistic techniques are under development.

The uranium needed to be delivered by uranium concentrate-producing plants as fuel for the nuclear plants will also increase over time; for the URE mid-case, from 13,300 tons U_3O_8 in 1981 to 23,600 in 1985, 28,900 in 1990, 35,000 tons in 1995, and 40,000 tons in 2000, if the enrichment plants are operated at 0.20% U-235 tails assay. Also shown are the requirements related to the 1976 and 1978 forecasts (see Figure 12).

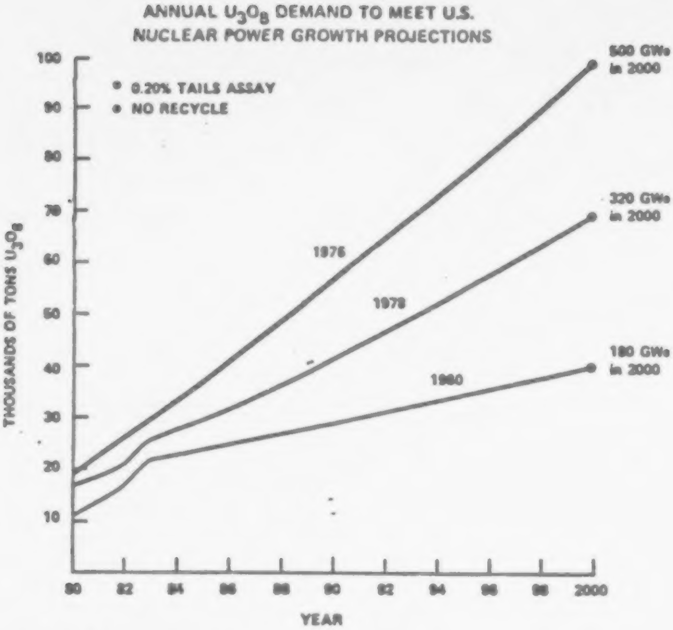
Cumulative uranium requirements through the year 2000 range from 510,000 to 620,000 tons U_3O_8 with 570,000 tons U_3O_8 for the mid-case.

Uranium requirements are based on normal lead times for fuel cycle steps and current technology for enrichment and for reactor design and operation. There are possible improvements in enrichment which would allow use of lower tails assays which would reduce uranium requirements. There are also possible improvements to reactor design and operation that could redduce uranium requirements. These factors are not likely to have a significant impact on uranium demands until at least well into the 1990's.

Figure 11: U.S. NUCLEAR POWER GROWTH PROJECTIONS (JUNE 1980)

	Gigawatts		
End of Year	Low	Mid	High
1980	50	51	54
1985	85	96	105
1990	125	129	140
1995	142	155	165
2000	160	180	200

Figure 12



ANNUAL U_3O_8 DEMAND TO MEET U.S. NUCLEAR POWER GROWTH PROJECTIONS

Domestic Uranium Procurement

The forecasts of uranium requirements are based on theoretical needs considering reactor start-up schedules and lead times, and are modified by enrichment contract data. Development of actual market data has been accomplished by the annual surveys conducted by DOE. These surveys indicate that the domestic uranium procurement, as shown by new commitments for future deliveries and actual deliveries during the 1975 - 1979 period, was as illustrated in Figure 13. Except for the peak procurement year of 1976, where some 83,400 tons of U_3O_8 were procured (a value which includes substantial "captive" procurement), annual contracting for uranium has been in the range of 11,500 to 15,400 tons U_3O_8.

Figure 13: PROCUREMENT AND DELIVERIES OF DOMESTIC URANIUM TO DOMESTIC BUYERS 1975-1979 (TONS U_3O_8)

Year	Net New Commitments for Future Delivery	Actual Deliveries
1975	14,500	12,500
1976	83,400	13,800
1977	11,500	13,900
1978	12,200	15,800
1979	15,400	16,500
TOTALS	137,000	72,500

As of July 1, 1980, producers had commitments for delivery to domestic buyers of a total of 217,800 tons U_3O_8, of which 104,800 tons were scheduled for delivery in the 1980-1985 period, as shown in Figure 14.

Figure 14: ANNUAL URANIUM DELIVERY COMMITMENTS, DOMESTIC PRIMARY PRODUCERS TO DOMESTIC BUYERS, as of JULY 1, 1980

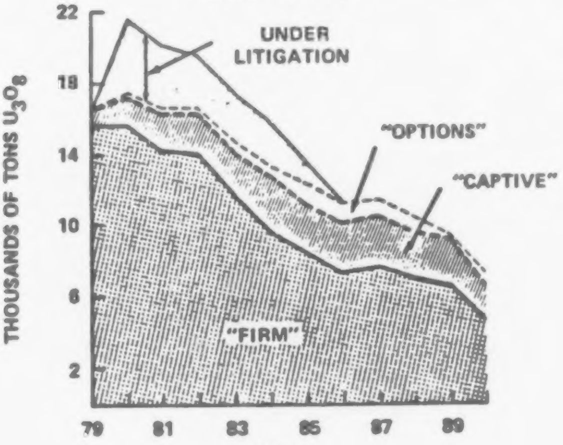
Year of Delivery	Tons U_3O_8
1980	20,800
1981	18,600
1982	18,700
1983	17,300
1984	15,700
1985	13,700
TOTALS	104,800

Figure 15 shows the distribution of 1979-1980 domestic sales commitments in four categories as of January 1, 1980, as "firm," "options," "captive," and "under litigation."

Figure 15

COMPONENTS OF DOMESTIC SALES COMMITMENTS

DOMESTIC PRODUCERS TO DOMESTIC BUYERS
JANUARY, 1980



The uranium under "firm" contracts is the portion considered as most likely to be delivered on schedule at agreed prices, although a few contracts are likely tc be modified. "Options" and material "under litigation" comprise a significant part of the scheduled 1980-1985 procurement, and delivery of some of this material may be delayed, or the quantities modified. "Captive" uranium production, i.e. from properties controlled by buyers, represents a sizable segment of 1980-1985 domestic uranium procurement. In 1985, 35 percent of deliveries under the existing arrangements would be from captive sources.

Unfilled Requirements

As of January 1, 1980, U.S. buyers reported to DOE that they had total unfilled uranium requirements of 12,600 tons U_3O_8 for the 1980-1985 period (see Figure 16). Two-thirds of the unfilled requirements are for 1984 and 1985. These requirements are far below the 33,700 tons U_3O_8 that U.S. producers reported to DOE in early 1980 would be available for sale in excess of their current sales commitments during the 1980-1985 period. Additional modifications to unfilled requirements probably occurred in 1980, as additional material was contracted for and reactor schedules were modified.

Figure 16: UNFILLED URANIUM REQUIREMENTS*
AS OF 1/1/80
TONS U_3O_8

Year	Annual	Cumulative
1980	400	400
1981	800	1,200
1982	1,300	2,500
1983	1,800	4,300
1984	4,000	8,300
1985	4,300	12,600
1986	9,900	22,500
1987	11,700	34,200
1988	12,000	46,200
1989	15,100	61,300
1990	14,400	75,700

*Assuming enrichment tails assay of 0.20% U-235, no recyle

Inventories

Buyers' inventories of uranium have been increasing for several years as actual deliveries have been in excess of needs. Inventories at the beginning of 1980 totaled 36,100 tons of natural uranium (Figure 17), with 27,600 tons held by utilities. In 1980 U.S. utilities sent an equivalent of 17,300 tons U_3O_8 to the DOE gaseous diffusion plants for enrichment. Thus, the 27,600 ton inventory level amounted to 1.6 years of U.S. utilities' needs. Of those U.S. utilities who have responded to questions on inventory levels, most have indicated that they desire a level amounting to about one year's needs, although some have reported inventory levels as small as three month's, while others desire inventories as great as two year's needs. Producers also had inventories of about 2,400 tons U_3O_8 at the beginning of 1980, which is about a normal working inventory.

Figure 17: Buyers' Inventories
Natural Uranium
Tons U_3O_8

Beginning of Year	Domestic Origin	Foreign Origin	Total
1976	22,600	1,100	23,700
1977	25,800	3,500	29,300
1978	25,100	3,600	28,700
1979	28,000	5,200	33,200
1980	30,800	5,300	36,100

Surplus inventories have started to appear in the market place and have been of concern to the producing industry. The ten utilities with the largest inventories of normal uranium hold 48 percent of the total utility inventory of 27,600 tons of U_3O_8. In 1979, some buyers with excessive inventory levels sold or loaned 3,300 tons U_3O_8. At least half of these utility sales and loans were made to uranium producers. For 1980 DOE has again requested information from utilities on sales and loans as part of its uranium market survey. To date, 32 out of 60 utilities have responded to the survey. Of those utilities, five report that 600 tons U_3O_8 of their excess inventory has been sold, whereas two report that 750 tons U_3O_8 has been loaned. Nearly all of these sales and loans were made to uranium producers. Most of the utilities who sold uranium had reactor projects that had been cancelled, or had slipped significantly. The two utilities who loaned uranium had reactors that were operating, or were about to be licensed, so that U_3O_8 would be needed in the near future.

The outlook is for a continuing buildup of buyers' inventories, as current contracted deliveries are in excess of actual needs. The buildup in inventories may be of increasing concern to producers as a potential source of additional competition, if buyers choose to reduce their inventory levels. To date, inventory movement has been minor as buyers generally have preferred to hold the inventory, or loan it out, rather than sell it. Inventory sales in 1980, however, have had an impact on uranium prices.

Domestic Supply

Using January 1980 DOE market survey data, we can obtain an indication of possible future domestic uranium supply, production potential, and apparent requirements (see Figure 18). Apparent supply - Column 7 - can be obtained by combining domestic (column 1) and foreign (column 2) uranium delivery commitments with the additional domestic uranium available for sale, for which data is only available through 1985 (column 3). (This does not include the use of inventories). As indicated in Figure 18, the total domestic supply of 25,900 tons in 1980 would increase to 27,000 tons in 1983. Figure 19, which recaps the data of Figure 18, depicts U.S. uranium supply versus requirements for the 1980-1990 period. It is evident that the available domestic supply for the 1980-1985 period is greater than either the apparent buyer requirements or the URE requirements forecast for those years, and further production cutbacks may be expected. For the period 1980 through 1985 cumulative supply (Column 7) exceeds cumulative buyer requirements by some 21,100 tons U_3O_8. In addition, some part of the 36,100 tons of buyer inventory would remain unused during the period (from Figure 17).

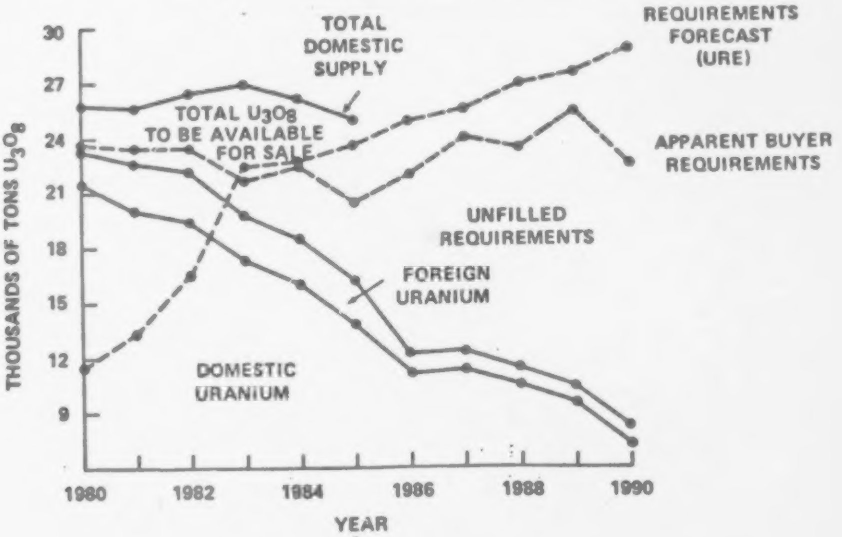
Figure 18

U.S. URANIUM SUPPLY & MARKET SUMMARY

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	SALES COMMITMENTS							
YEARS	TO DOMESTIC BUYERS	TO FOREIGN BUYERS	ESTIMATED U3O8 TO BE AVAIL. FOR SALE	PROCUREMENT OF FOREIGN URANIUM	REPORTED UNFILLED REQ'MT	TOTAL DOMESTIC PRODUCTION POTENTIAL (1+2+3)	TOTAL DOMESTIC SUPPLY (1+3+4)	APPARENT BUYER REQ'MTS (1+4+5)
1980	21,500	2,000	2,600	1,800	400	26,100	25,900	23,700
1981	20,000	1,000	3,100	2,700	800	24,100	25,800	23,500
1982	19,400	1,000	4,300	2,800	1,300	24,700	26,500	23,500
1983	17,400	900	7,100	2,500	1,800	25,400	27,000	21,700
1984	16,000	500	7,800	2,500	4,000	24,300	26,300	22,500
1985	13,900	500	8,800	2,400	4,300	23,200	25,100	20,600
1986	11,200	300		1,000	9,900			22,100
1987	11,400	300		1,000	11,700			24,100
1988	10,500	300		1,000	12,000			23,500
1989	9,500	100		1,000	15,100			25,600
1990	7,300	100		1,000	14,400			22,700

Figure 19

U.S. URANIUM SUPPLY VS. REQUIREMENTS



Foreign Uranium Procurement

In the 1970-1979 period U.S. companies contracted to buy about 30,000 tons of U_3O_8 for domestic end-use from Australia, France (including its African partners, Niger and Gabon), Namibia, and South Africa. The imports that were delivered for domestic end-use in the 1975-1979 period totalled 9,400 tons U_3O_8, while those to be delivered in the 1980-1985 period now total 15,000 tons. Some additional foreign uranium was contracted for in 1980. A contract for 2,250 tons from Australia for delivery over a nine-year period was announced. Figure 20 shows the percentages of uranium imported for domestic end-use from each country. Some 10 U.S. utilities out of a total of 55 in the uranium market have contracted directly with foreign suppliers for purchase of 16,400 tons of foreign uranium. Three utilities alone account for 80 percent of the commitment. Thus, most utilities have not purchased foreign uranium. A number of other utilities have received foreign-origin uranium from domestic suppliers.

Figure 20: U.S. IMPORTS OF URANIUM FOR DOMESTIC END-USE

	Percentages of total imports	
Country	1975-1979 period	1980-1985 period
Australia	10	8
Canada	39	50
France	36	7
Namibia and South Africa	15	35
	100	100

Figure 21 presents the pattern of contracting for foreign-origin uranium for domestic end-use based on a review of existing contracts and when those contracts were initially made. Also shown are actual deliveries in those years. The most active period of procurement of foreign uranium was in 1974 and 1975, when about half of total foreign uranium procurement contracting took place. (Some additional foreign purchase contracts were made in that period, but have since been cancelled because of price disputes). The procurement of foreign uranium in the 1974 and 1975 period was strongly influenced by the difficulty of contracting for domestic uranium at that time. A large domestic procurement effort in 1973 and 1974 had absorbed most of the uranium then available for contracting from domestic producers. Since 1975 foreign procurement has been at lower levels. Foreign procurement was 900 tons in 1979. Procurement in 1980 was somewhat higher (final 1980 data are not yet available).

Utilities have, in practice, followed a strong policy of buying U.S. uranium. This policy can be expected to continue, if there are only minor price differentials between foreign and domestic uranium. If significant price differentials develop, utilities would undoubtedly reexamine such policies. The state public utility commissions would influence utilities in the determining of such policy. The trade-off of security of supply for a price differential for a commodity that is critical to the operation of a large powerplant will not be lightly done. In practice it might be expected that some public utility commissions would encourage utilities to seek the lowest cost fuel, while others would emphasize security of supply and use of domestic sources.

Figure 21: PROCUREMENT AND DELIVERIES OF FOREIGN-ORIGIN U_3O_8
FOR DOMESTIC-END USE

Year	New Commitments		Actual Deliveries
	Tons U_3O_8	No.	
1970	2,100	1	0
1971	0	0	0
1972	7,700	2	0
1973	1,100	1	0
1974	10,600	2	0
1975	4,600	5	700
1976	500	2	1,800
1977	1,500	1	2,800
1978	500	2	2,600
1979	900	1	1,500
TOTALS	29,500	17	9,400

Figure 22 shows the annual U.S. uranium import and export commitments for 1980 through 1985. The U.S. will be a net exporter in 1980 by 200 tons, then will be a net importer for 1981 through 1985 by some 1,600 to 2,000 tons per year. As additional sales contracts for U.S. uranium or purchase contracts for foreign uranium, are made there will be changes in this picture.

U.S. producers have, in the past, been able to make sales to foreign buyers. These sales have largely been for near-term delivery when foreign supplies have been tight and in periods of higher prices. The outlook for significant additional foreign sales does not appear favorable at the present time.

Figure 22: CURRENT U.S. URANIUM IMPORT AND EXPORT COMMITMENTS
AS OF JANUARY 1, 1980
(TONS U_3O_8)

Year of Delivery	Imports	Exports*	Excess of Imports Over Exports
1980	1,800	2,000	(200)
1981	2,700	1,000	1,700
1982	2,800	1,000	1,800
1983	2,500	900	1,600
1984	2,500	500	2,000
1985	2,400	500	1,900
1986-1990	5,000	1,100	3,900
TOTALS	19,700	7,000	12,700

* Sales commitments of domestic-origin uranium to foreign buyers.

The actual deliveries of foreign uranium to the U.S. DOE enrichment plant vary from the schedule in which the uranium was delivered to the buyers. Through 1979 deliveries to the plant have been much less than the allowable limits under current DOE regulations (see Figure 23). Foreign uranium deliveries for domestic end-use accounted for 4.7 percent of 1977 deliveries, 5.7 percent of 1978 deliveries, and 9.3 percent of 1979 deliveries. The respective allowable limits for those years were 10, 15, and 20 percent. In 1980 foreign uranium represented 10 percent of the total 1980 feed deliveries to the DOE enrichment plant compared with the year's allowable limit of 30 percent. A few utilities have used all the allowable foreign uranium. Most have used none.

Figure 23: DELIVERIES OF URANIUM TO DOE BY DOMESTIC URANIUM ENRICHMENT CUSTOMERS

Calendar Year	Tons U_3O_8			Actual Percent Foreign	Allowable Percent Foreign
	U.S. Origin	Foreign Origin	Total		
1977	14,240	703	14,943	4.7%	10
1978	11,957	728	12,685	5.7%	15
1979	15,436	1,591	17,027	9.3%	20
1980	11,135*	1,241*	12,376*	10.0%	30

*Revised on April 16, 1981.

Uranium Prices

During the period 1973-1979, the average delivery price per pound of U_3O_8 for sales from domestic producers to domestic buyers, in year of delivery dollars, increased from $7.10 to $23.85 as shown in Figure 24.

Figure 24: HISTORICAL TREND OF AVERAGE URANIUM PRICES (Year-of-Delivery Dollars)

Dollars Per Pound U_3O_8

Year	Final Price
1973	$ 7.10
1974	7.90
1975	10.50
1976	16.10
1977	19.75
1978	21.60
1979	23.85

Future prices for material under contract as of July 1, 1980, as reported to DOE, is shown in Figure 25. Also shown are the percentages of material under contract price arrangements covering the price data presented. The remainder is in market price contracts or in captive production.

Figure 25: AVERAGE CONTRACT PRICES AND SETTLED MARKET PRICE CONTRACTS FOR URANIUM
July 1, 1980

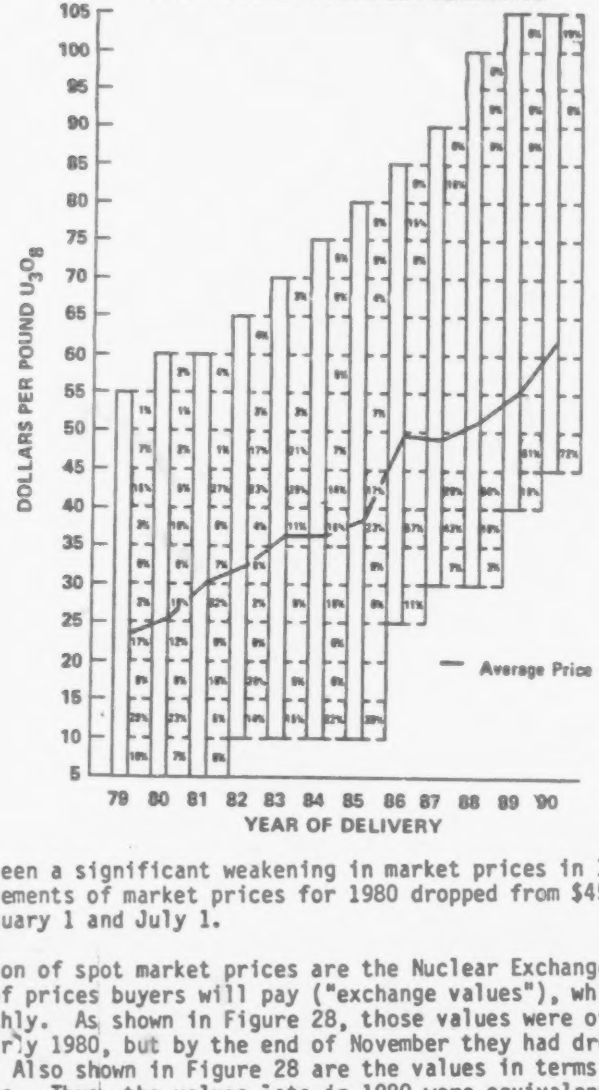
Year	Dollars Per Pound U_3O_8 (Year-of-Delivery Dollars)	Percentage of Procurement Under Contract Price Contracts
1980	26.00*	66
1981	28.70*	55
1982	34.80	47
1983	41.40	43
1984	43.45	35
1985	43.45	32
1986	46.85	16
1987	43.55	18
1988	42.70	22
1989	51.85	23
1990	53.25	16

* These years include settled market price contracts. Market price contract prices are determined sometime before delivery based on prevailing market prices.

Figure 26 depicts the annual distribution, by $5 increments, of average contract price commitments (and settled market prices) of domestic uranium for the 1979-1990 period as of January 1980. The $5 increments constituting at least 15 percent of any year's delivery commitments are shaded. Reported prices for 50 percent of 1980 deliveries average under $25 per pound U_3O_8. Significant, but smaller, portions of the 1981-1985 delivery commitments are also at prices below $25 per pound. In contrast, by 1986 no buyers' average delivery prices are below $25.

Figure 26

DISTRIBUTION OF U_3O_8 PRICES, 1/1/80 CONTRACT PRICES AND MARKET PRICE SETTLEMENTS



There has been a significant weakening in market prices in 1980 (Figure 27). Settlements of market prices for 1980 dropped from $45.80 to $39.45 between January 1 and July 1.

An indication of spot market prices are the Nuclear Exchange Corporati estimates of prices buyers will pay ("exchange values"), which are published monthly. As shown in Figure 28, those values were over $40 per pound in early 1980, but by the end of November they had dropped to $27 per pound. Also shown in Figure 28 are the values in terms of constant 1976 dollars. Thus, the values late in 1980 were equivalent to those that prevailed in early 1975. The price reductions reflect the lack of demand for uranium and the over-supply situation.

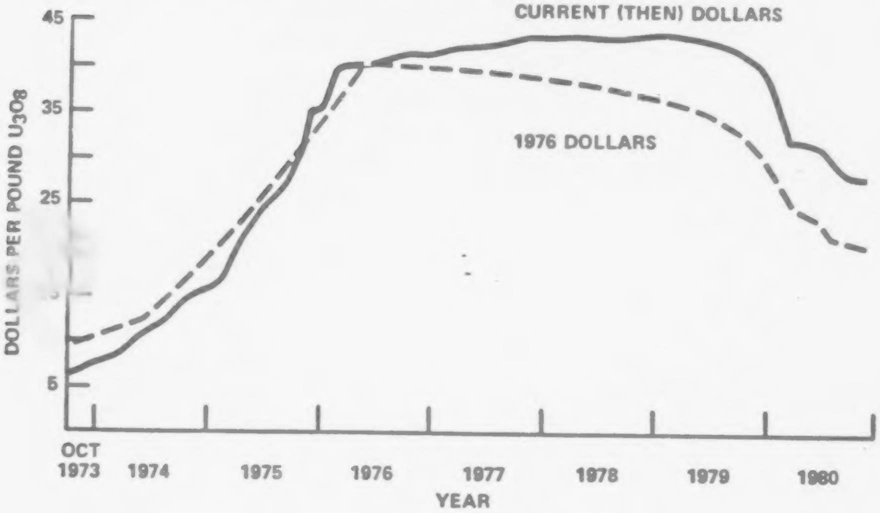
Figure 27: PRICE SETTLEMENTS OF MARKET PRICE CONTRACTS (TONS U_3O_8 IN YEAR-OF-DELIVERY DOLLARS)

	As of 1/1/80		As of 7/1/80	
Year of Delivery	Average Price Per Pound	Tons	Average Price Per Pound	Tons
1979	$42.55	2,700	$---	---
1980	$45.80	800	$39.45	1,700

Little information has been published on prices paid or to be paid for foreign-origin uranium. Prices usually are established at market prices and are similar to U.S. prices.

Figure 28

NUEXCO MONTHLY EXCHANGE VALUES



FOREIGN SUPPLY AND DEMAND OUTLOOK

Uranium Resource Estimates

The most reliable source of information on world uranium resources is that compiled by the Working Party on Uranium Resources sponsored jointly by the Nuclear Energy Agency (NEA) and the International Atomic Energy Agency (IAEA). This group has been gathering and publishing uranium resource estimates since 1965 and includes most of the significant uranium resource countries. In compiling its estimates, this group classifies resources as Reasonably Assured resources (roughly comparable to ore reserves in the usual mining industry sense) and Estimated Additional resources (roughly comparable to DOE's probable potential resources). Resources in the world outside of the centrally planned economies area (WOCA) are tabulated by continents and major countries in Figure 29.

Figure 29: WORLD URANIUM RESOURCES BY CONTINENT[1]
(WORLD OUTSIDE CENTRALLY PLANNED ECONOMIES AREA)
THOUSAND TONS U_3O_8

	Reasonably Assured		Estimated Additional	
	$30/lb	$50/lb[2]	$30/lb	$50/lb[2]
North America	930	1,290	1,410	2,440
U.S.	645	940	885	1,430
Canada	280	305	480	945
Other	9	44	44	65
Africa	790	1,000	180	340
South Africa	320	508	70	180
Niger	210	210	69	69
Namibia	152	173	39	69
Other	109	115	2	22
Australia	380	390	165	180
Europe	90	510	60	130
France	51	72	34	60
Spain	13	13	11	11
Sweden	1	390	0	4
Other	22	31	19	53
Asia	50	60	0	30
India	39	39	1	31
Other	13	21	0	0
South America	130	130	130	140
Brazil	96	96	117	117
Argentina	30	36	5	12
Other	0	0	7	8
Total (rounded)	2,400	3,400	1,900	3,300

1/ Modified from "Uranium Resources, Productin and Demand" OECD, Nuclear Energy Agency (NEA), and the International Atomic Energy Agency (IAEA), December 1979.

2/ Includes resources at $30/lb U_3O_8

Almost 80 percent of these resources are concentrated in three continents: North America, Africa, and Australia. Six countries within those continents - U.S., Canada, South Africa, Namibia, Niger, and Australia have about three-quarters of the Reasonably Assured resources. This geographic concentration is a reflection of the geologic favorability of these areas. The fact that these areas have received the most intensive exploration and resource appraisal work to date is also significant.

Figure 30: FOREIGN URANIUM PRODUCTION CAPABILITY

(Thousand Tons U_3O_8)

Year	Class[1/]	Australia			Canada			France			Namibia			Niger			S. Africa			Other[2/]			Foreign Total		
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
1980		1.3	0	0	9.8	0	0	4.5	0	0	5.3	0	0	5.2	0	0	8.3	0	0	4.1	0	0	38.5	0	0
1981		1.8	1.1	0	9.8	1.4	0	4.5	0.2	0	5.3	0	0	5.2	0	0	8.3	0	1.2	4.1	0	0.8	39.0	2.7	2.0
1982		1.8	3.3	0	9.8	1.9	0	4.5	0.5	0	5.3	0	0	5.2	0	0	8.3	0	2.9	4.1	0	3.0	39.0	5.7	5.9
1983		1.8	3.3	0	10.5	1.9	2.0	4.5	0.7	0	5.3	0	1.2	5.2	0	0	8.3	0	4.6	4.1	0	4.1	39.7	5.9	11.9
1984		1.8	3.3	0	11.0	2.9	4.0	4.5	0.7	0	5.3	0	1.2	5.2	0	0.7	8.3	0	5.2	4.1	0	4.4	40.2	6.9	15.5
1985		1.8	3.3	6.5	12.0	2.9	5.0	4.5	0.7	0	5.3	0	1.2	5.2	0	2.5	8.3	0	5.5	4.1	0	5.1	41.2	6.9	25.8
1986		1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.6	4.1	0	5.1	40.6	7.6	35.8
1987		1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.6	4.1	0	5.2	40.6	7.6	35.9
1988		1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.5	4.1	0	5.3	40.6	7.6	35.9
1989		1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.5	4.1	0	5.4	40.6	7.6	36.0
1990		1.2	3.3	11.5	12.0	2.9	7.2	4.5	1.4	0	5.3	0	1.2	5.2	0	5.2	8.3	0	5.2	4.1	0	5.5	40.6	7.6	35.8
																								84.0	

[1/] Class
1) Currently Operating Plants
2) Plants Under Construction
3) Planned Plants

[2/] Includes: Argentina, Brazil, CAR, GABON, India, Italy, Mexico, Portugal, Spain, Yugoslavia

Based on "Uranium Resources, Production and Demand," December 1979.

12/9/80

Production Capacity and Plans

Studies by the NEA and the IAEA have also provided reliable information on world production capacity. The current production capacity of non-U.S. plants (Class 1) is about 38,000 tons U_3O_8 annually, as shown in Figure 30. This production is primarily in Canada, France, Namibia, Niger, and South Africa.

Construction of new plants (Class 2) with a capacity of about 8,000 additional tons is taking place, primarily in Australia and Canada. Plants that are planned (Class 3) could increase total annual production by another 36,000 tons U_3O_8 for a total of 84,000 tons U_3O_8. Since needs for uranium are well below attainable production capacity levels and prices would not justify all operations, it is likely that many of the projected plants will be built on a deferred schedule. It is also possible that some new plants will replace existing operations. Countries of particular significance in future production expansion are Australia and Canada, which have 82 percent of capacity under construction and 70 percent of the planned additional capacity.

A large part of the production capacity of plants currently operating, or under construction, has been committed to sale. However, a significant amount of low-cost uranium remains to be sold. Additional planned plants would increase the amount to be available. The additional low cost (less than $15 to $20 per pound) material available ranges from several hundred tons per year for the next few years to a potential of several thousand tons per year by the mid-1980's. The actual development of new low-cost capacity and the relationship to future market needs and prices will need continued tracking and study.

Australia has two mine/mill complexes currently operating, Mary Kathleen and Nabarlek, with a total annual production capacity of 1,300 tons U_3O_8. Construction is proceeding toward a 1981 startup on the Ranger mine-mill complex with a planned annual capacity of 3,300 tons U_3O_8. Production from these three centers is essentially committed to purchasers through 1990. A mill for the Yeelirrie deposit of Western Mining has been approved by the Australian government. Other planned plants and mines in Australia, not yet under construction have a potential annual capacity of an additional 11,500 tons U_3O_8 . Actual construction may be delayed a number of years in view of the uncertain market. The new Australian production costs will be low by world standards, as the deposits are large, have high ore grades, and will be easy to mine, usually by open pit methods. In Canada, operating mine-mill complexes produce about 9,800 tons U_3O_8 per year. Production is from four mines in Ontario and two mines in Saskatchewan. Production is largely committed under long-term sales contracts. Two mills with a total annual capacity of 2,900 tons capacity are under construction, one in Saskatchewan and one in Ontario. These mills are largely covered in sales contracts. Additional planned mine-mill complexes are projected to have a production of about 7,200 tons U_3O_8 per year. Since none are covered by sales contracts, timing is uncertain.

Foreign Market Outlook

The uranium requirements in non-Communist foreign countries have been projected by the Energy Information Administration based on the reactors planned and timing of construction. Figure 31 shows three cases of power plant growth which, by the year 2000, range from 300 GWe to 400 GWe of nuclear power in operation. The mid-case is taken as the most likely one. However, nuclear power growth projections have been subject to continual downward revision in the last several years.

In order to supply these nuclear plants, EIA has estimated the amount of uranium required, assuming 0.20% U-235 enrichment plant tails and no recycle of uranium or plutonium. Figure 31 gives the annual tons U_3O_8 from 1980 to 2000 for high-, mid-, and low-cases.

Figure 31: FOREIGN NUCLEAR CAPACITY AND URANIUM REQUIREMENTS

	Capacity GWe			Requirements Tons U_3O_8 (0.20% U-235 Tails Assay)		
	Low	Mid	High	Low	Mid	High
1980	66	68	77	17,300	18,400	19,800
1985	117	124	128	24,000	26,200	29,200
1990	165	181	201	27,500	31,600	32,700
1995	229	252	280	34,600	41,500	47,800
2000	300	350	400	42,700	54,100	64,300

For the mid-case, foreign requirements increase from 18,400 tons U_3O_8 in 1980, to 26,200 tons U_3O_8 in 1985, and to 54,100 tons U_3O_8 in the year 2000. Cumulative requirements total 717,000 tons U_3O_8.

If all the planned foreign mine-mill production came on-stream as currently projected, there would be considerable excess capacity. If only operating mills, or those under construction were available by the late 1980's, production capacity would cover annual demands through the late 1990's.

Additional projections of WOCA nuclear growth and uranium requirements were developed during the International Nuclear Fuel Cycle Evaluation (INFCE). While the projections are now considered as high by many, they do provide an additional, more optimistic viewpoint on future nuclear growth. The INFCE low case - modified to exclude the U.S. - indicated a growth in foreign (WOCA) nuclear capacity from 82 GWe at the end of 1980 to 217 GWe in 1990 and 580 GWe in the year 2000. Corresponding foreign uranium requirements would be 21,000 tons in 1980, 50,000 tons in 1990, and 120,000 tons in 2000. Such projections indicate a much larger possible growth in future uranium demands.

Foreign Development and Export Policies

Government policy toward uranium exploration production and exportation varies significantly among the major uranium exporting nations. In the case of Canada it varies among provinces. Generally, foreign governments treat uranium as a nuclear material needing central control much more than other mineral commodities. As Australia and Canada are the principal potential sources of additional foreign uranium that might be imported, their development and export policies are highlighted below.

Australia

- Sales are permitted only to countries with bilateral agreements for peaceful uses who have signed the Non-Proliferation Treaty. Sales are subject to IAEA safeguards inspection and consent is needed for reprocessing or transfer.
- Prior consent would be required for buyers - including U.S. buyers - to process Australian uranium.
- Sales policy and contract guidelines are provided to producers.
- New contracts are subject to government approval, including duration of the contract, quantities involved, method of shipment, price, and use of the uranium.
- Sales prices are based on prevailing market prices, but have negotiated floor prices that are subject to escalation for cost increases and market price developments.
- Contracts provide for a portion, up to 35 percent, of uranium sold to be in the form of converted uranuim (UF_6), or enriched uranium, starting in 1990.
- Regulated development of resources by private enterprise with foreign exploration is permitted.
- Australian control of producing uranium properties is required. A 75 percent share is desired, but participation can go as low as 50 percent in exceptional circumstances.

The Australian Labor Party, which is now the opposition party, has indicated they may disavow uranium sales contracts, if they are voted into power. However, uranium policy has been the subject of debate within the party. This has clouded the Australian position as a supplier in the views of some, though their ability to disavow contracts will diminish as time goes on and the industry becomes more established. Some labor unions have also opposed and impeded uranium activities.

Canada

- All exports must be for peaceful purposes only, and appropriate nuclear safeguards arrangements and bilateral agreements must be in place.

- All aspects of exports sales are subject to review and approval by the Government.
- Export approvals will be limited to 15 years from date of contract signing, the last five of which may be subject to partial control.
- Domestic utilities are expected to maintain a contracted 15-year forward fuel supply for their operating and committed reactors. A producer's uncommitted uranium resources must be sufficient to meet its share of the 30-year national requirement.
- All exports of uranium must be processed to the most advanced form possible in Canada, unless special exemption is obtained. Currently exports are in the form of UF_6.
- Pricing conditions offered to foreign customers will not be more favorable than those offered domestic purchasers. Final prices must reflect prevailing world prices and are subject to annual renegotiation. Contracts must contain floor prices covering production costs.
- The Federal Government's uranium stockpile will be disposed of only on the domestic market and will be available on a loan basis for the needs of Canadian producers and utilities.
- Non-resident ownership of new uranium operations will be restricted to 33 percent. Exceptions may be granted that would permit a maximum uranium level of 50 percent, if judged to be of significant benefit to Canada. No exceptions have been granted to date.

The Canadian provinces have been increasingly involved in development and control of the uranium industry. British Columbia and Saskatchewan have been particularly active. In February 1980, the government of British Columbia declared a seven year moritorium on uranium exploration and the development of deposits already discovered. The Saskatchewan government, on the other hand, has been very actively participating in the uranium industry. It established a government corporation, the Saskatchewan Mining Development Corporation (SMDC), in the early 1970's to participate in exploration, development, production, and sales of uranium in the province. SMDC has the right to participate in any private exploration project it chooses and acquire up to 50 percent equity. The corporation has been very aggressive and now constitutes a major force in the Canadian uranium industry.

Saskatchewan also has a provincial royalty system related to the profitability of the operation, which can add significantly to costs. Provincial royalties can be over $15 per pound of U_3O_8 produced.

Cartels

The concentration of world uranium resources and production has, in past periods of low prices and ore production, fostered attempts to form cartel-like organizations seeking to restrict the free movement of uranium and influence pricing. The concentration of uranium production in a few countries will continue for some time, though there is an increasing diversity of supply sources. The opportunity for future foreign cartel-like activities will continue, particularly if uranium producer country governments are involved, which has been the case in the past. However, the severe criticism of such practice and the legal actions that have resulted in the United States might operate to discourage such activities in the future. Since the U.S. has the capability of producing a large portion - or all - of its uranium needs and U.S. uranium buyers historically have shown a strong preference for domestic uranium, the U.S. is not expected to develop a large dependence on foreign uranium. These factors would tend to reduce the susceptibility of the U.S. to direct impacts of any cartel-like activity.

CONTROLLING THE USE OF URANIUM IN THE UNITED STATES

Experience To Date

Our experience regarding use of foreign uranium was summarized in Figure 23. As indicated in Figure 23, in 1977 some 703 tons U_3O_8, or about 4.7 percent of the uranium brought to the Government's enrichment plants for domestic end-use, was of foreign origin compared to an allowable 10 percent. In 1978 some 728 tons, or about 5.7 percent foreign uranium, was brought to the plant compared to an allowable 15 percent. In 1979 the quantity increased to 1,591 tons, about 9.3 percent of the feed, compared to the allowable 20 percent. In 1979 toll enrichment feed deliveries involved 46 domestic utilities and reactor manufacturers. Nineteen of these companies, or 41 percent, utilized some foreign uranium. Eight of the companies used 19 percent, or more, of feed of foreign origin or, in effect, virtually all that was allowed to them. Some 44 percent of the uranium was of Canadian origin, 10 percent from Australia, 19 percent from South Africa, and the balance from France and its African uranium partners.

Deliveries in 1980 were at a higher level than 1979. Some 1,241 tons, or 10 percent of the uranium provided, was of foreign origin compared to an allowable 30 percent. Sixteen of 46 companies bringing uranium to the enrichment plant utilized foreign fuel. The 16 used an average of 23 percent foreign feed. Eight used the fully allowable 30 percent.

In summary, experience to date has been that actual use of foreign uranium has been well below the allowable quantities. Uranium buyers have preferred domestic origin material and most utilities have used no foreign uranium at all. To date, the current plan for removal of restrictions has worked out well.

Outlook Under the Current System

It is likely that over the next few years most domestic utilities will continue to buy U.S.-origin uranium and that the actual percentages of foreign uranium utilized will be well below the allowable quantities.

The percentages allowable, however, in 1981 and later years will be sufficiently high that they would allow the use of a fairly large percentage of foreign uranium. To overcome current buyer preference for domestic uranium would likely require some combination of significant price differential for foreign uranium and assurance of supply from foreign sources under such purchase contracts. The pricing of foreign-origin uranium has not been significantly different from U.S. prices, as foreign producers and governments have been seeking the highest prices attainable. Current policies suggest a continuing desire not to disrupt world prices or to instigate a price cutting activity to gain market dominance. The possibility for price cutting, however, does exist.

Experience suggests that there will be uncertainty about assurance of foreign supplies. Unilateral cutoffs of shipments, or changes to contract terms and prices, have been made from time to time and are possible with any change in government. The increasing role of state or provincial governments to extend controls over uranium production also creates questions of supply assurance under contracts. Buyers can, of course, reduce such risks by a mixture of foreign and domestic procurement and by diversifying foreign procurement amongst several suppliers.

A plausible course of events under the current schedule for removal of restrictions would be the increasing use of foreign uranium and the development of a price differential between domestic and foreign sales. The magnitude of the price differential would be very influential in determining the extent of utilization of foreign uranium. However, as additional market opportunities in the U.S. are limited over the next 5 years, the further penetration of foreign-origin uranium will be restricted in that time period.

The outlook may be clarified by reference to Figure 32. Projected requirements for the 1981 through 1985 period are some 98,700 tons U_3O_8, for which some 84,000 tons are under contract with domestic producers and 12,900 tons with foreign producers. (In addition, the buyers hold some 36,000 tons in inventories). The foreign deliveries constitute about 13 percent of the requirements and about 13 percent of total purchase commitments. The contracted deliveries show that very little additional uranium procurement is needed through 1985.

Nonetheless, there are some utilities that do need additional uranium. If their unfilled requirements are considered, the picture may change. The estimates of unfilled requirements were reported to DOE in early 1980, and hence are likely to have been reduced by this time. If all the reported unfilled requirements were filled with foreign uranium - a worst possible case - the percentage of procurement from foreign sources for the 1981 through 1985 period, as shown in Figure 32, would increase from 13 percent to 23 percent. Annual values would range from 16 percent in 1980 to 33 percent in 1985.

In the period after 1985 the foreign uranium under contract is a lower percentage of requirements, around 4 percent through 1990. Inasmuch as unfilled requirements were higher post-1985, the maximum possible foreign uranium is also higher. The maximum increases to 47 percent in

1986 and to 62 percent in 1990. This would, of course, assume that only foreign uranium would be bought in the future, which is extremely unlikely. Thus, the potential additional penetration of foreign uranium into the U.S. is limited over the next few years, but could increase subsequently.

Figure 32: MAXIMUM POSSIBLE FUTURE ROLE OF FOREIGN URANIUM IN THE U.S.

Year	1 Requirements URE Tons U_3O_8	2 Existing Purchase Commitments Domestic Tons U_3O_8	3 Existing Purchase Commitments Foreign Tons U_3O_8	4 Percent Foreign of Requirements (3/1)	5 Percent Foreign of Purchase Commitments (3/(2+3))	6 Unfilled Requirements Tons U_3O_8	7 Maximum Percent Foreign Deliveries (3+6)/(2+3+6)
1981	13,300	18,600	2,700	20	13	800	16
1982	16,600	18,700	2,800	17	13	1,300	18
1983	22,400	17,300	2,500	11	13	1,800	20
1984	22,800	15,700	2,500	11	14	4,000	29
1985	23,600	13,700	2,400	10	15	4,300	33
Total 81-85	98,700	84,000	12,900	13	13	12,200	23
1986	25,000	12,400	1,000	4	7	9,900	47
1987	25,600	12,800	1,000	4	7	11,700	60
1988	27,000	12,000	1,000	4	8	12,000	52
1989	27,500	11,300	1,000	4	8	15,100	59
1990	28,900	9,400	1,000	3	10	14,400	62
Total 86-90	134,000	57,900	5,000	4	8	63,100	54

FINDINGS

Out of the factual material presented in this report, certain salient observations and conclusions warrant special note.

Uranium Mining Industry Status

- The U.S. has a substantial uranium resource base, but only limited portions of the U.S. resources are economic at prices expected to prevail during the next several years.

- Industry has been conducting vigorous exploration programs. While reported plans indicate a continuing high level of activity, the level of activity declined substantially in 1980.

- Current production capacity is around 22,000 tons U_3O_8. This is well in excess of current U.S. requirements. Planned additions to capacity at 8,000 tons per year can keep U.S. production capacity at more than adequate levels through the 1980's. Further additions would be needed to meet projected longer term demands.

- The cost of production of about 18 percent of 1981 domestic capacity will be \$20, or less, per pound of U_3O_8 and 45 percent will be at costs below \$25 per pound. The remaining 55 percent would have higher costs. Production, with costs above \$20 to \$25 per pound, probably would not be profitable at prices prevailing for new U_3O_8 contracts, i.e. in the \$25-\$30 range.

- Costs of uranium production have been increasing substantially.

- Capital investment in exploration and construction of mine and mill facilities has been at high levels - about \$800 million in 1979. While plans have called for mine and mill facilities to continue to increase in 1980 and 1981, planned capital expenditures for exploration have been decreasing.

- Employment in the uranium producing industry reached peak levels in 1979 but has since declined, particularly among miners. Uranium workers are being absorbed by expansions of other mining activity, at least in some areas. Worker productivity in the uranium industry has been declining, but has stabilized somewhat the last two years.

- Revenues to the industry are at high levels, some 934 million dollars in 1979 and projected around \$1.1 billion in 1980. Most companies involved in the industry currently are financially viable. However, some uranium companies, and the uranium operations of some diversified companies, may be in poor financial health.

Domestic Uranium Supply and Demand

- Uranium requirements will continue to grow through the rest of the century, increasing from current levels of around 13,300 tons U_3O_8 to 23,600 tons in 1985, to 28,900 tons in 1990, and to over 40,000 tons in 2000. The "unfilled" uranium requirement, as reported by buyers, is limited in the near term, totaling 800 tons in 1981 and increasing to 4,300 tons in 1985.

- A total of 188,000 tons of U_3O_8 was under contract as of January 1980 to be purchased from domestic producers by domestic buyers and 7,000 tons by foreign buyers. Domestic delivery commitments to domestic and foreign buyers are 19,680 tons for 1981 delivery, decreasing to 14,200 tons in 1985.

- Foreign uranium purchase commitments by U.S. buyers, all to be delivered in the 1980 to 1990 period, totaled 19,700 tons at the beginning of 1980. Most of this uranium will be from Canada. In recent years U.S. exports have exceeded imports, but in 1981 and afterwards imports will be larger under current contracts.

- o Some 10 of the 55 U.S. utilities in the uranium market have contracted for foreign uranium. Three account for 80 percent of total firm commitments. U.S. utilities have generally followed a strong policy of buying domestic uranium in preference to foreign uranium.

- o The U.S. is largely self-sufficient in uranium and can remain so for many years. While the degree of future self-sufficiency will depend on U.S. buyer action and relative prices between U.S. and foreign uranium, current trends suggest a continuing high level of self-sufficiency at least through the 1980's.

- o After a sharp rise in price in the 1973 to 1976 period, prices were stable from 1976 to early 1980 at levels in the $40 to $43 per pound U_3O_8 range. Price reductions in 1980 to the high $20's occurred largely as the consequence of reducing procurement activity and increasing inventories, and a general oversupply situation. The outlook is for continuing downward pressure on prices during the next few years. In the longer term, future increases in prices are expected to occur as U.S. and world demand for uranium grows.

Foreign Uranium Supply and Demand

- o Foreign uranium resources are substantial and have been growing. Some of the more recently discovered deposits, especially in Canada and Australia, will have comparatively low cost uranium production. Foreign resources are largely in a few countries: Australia, Canada, South Africa, Namibia, and Niger, which together have 56 percent of WOCA $30 cost reserves. The U.S. has 27 percent of WOCA reserves.

- o Foreign annual uranium demands will increase from the 1981 level of 20,000 tons U_3O_8 to 26,000 tons in 1985, and to 32,000 tons in 1990.

- o Foreign uranium production capacity is approximately 38,000 tons U_3O_8 which is in excess of foreign uranium needs. Current and planned expansions to capacity will keep production at high levels relative to demand. Foreign annual capacity could increase to almost 79,000 tons by 1985 and to 84,000 tons by 1990. Actual expansion will depend on market conditions and needs, and hence is expected to be much less.

- o Uncommitted foreign production capacity now planned will be larger than foreign demands. The excess production capacity will have low costs of production and will be very competitive with U.S. production.

- o Resource development and export policies of the major uranium countries result in close government control on industry activities. Certain countries impose controls on the use of uranium for nonproliferation purposes. Marketing has been done cautiously to minimize market impacts ard obtain maximum prices.

Importation of Foreign Uranium for Domestic End-Use

- Experience to date in allowing use of foreign uranium has not resulted in a large switch to foreign uranium. In 1979 some ~~8~~ 9 percent of the feed delivery was of foreign origin, although 20 percent was allowed. In 1980 uranium of foreign origin amounted to 10 percent versus the 30 percent allowed.
- The reduction in foreign and U.S. uranium demands and the increasing foreign supply of lower cost uranium is expected to increase pressure on the U.S. market place. Buyer preference for domestic uranium may change, if significant price differentials develop. Over the longer term, rising U.S. and foreign demand for uranium may increase demands on supply, both in the U.S. and in the foreign market.
- The U.S. uranium industry faces a number of market, production cost, and price uncertainties. Foreign uranium has to date been of limited direct influence, but the potential exists for increased impacts. The primary problem facing domestic suppliers is the deferral of projected uranium demands resulting from reactor delays.
- Stricter limitations on foreign uranium would provide only very limited assistance to the U.S. industry over the next 3 to 5 years, in view of the state of U.S. uranium demands, existing sales contracts, and buyer inventories.

The data and findings contained in this report do not clearly point to the need to change the present course of action. DOE has currently in place a stepwise plan for removal of restrictions on enrichment of foreign uranium, on the basis that no clear or immediate threat to the industry from foreign uranium has been established. Further clarification of future uranium demands, buyer procurement policies, and foreign country export policies will continue to be needed to assure the validity of this policy. Data on these subjects will continue to be gathered and the situation assessed periodically. If at some time a change is warranted, a modification to foreign uranium control procedures could be reconsidered. This would present some risk to the domestic industry, but will probably result in the least overall planning adjustments for all involved, i.e. the U.S. producers and buyers, and foreign producers and buyers. Also, foreign confidence in the U.S. as a stable and reliable participant in this nuclear enterprise will be enhanced. This policy is consistent with the free market concepts of the administration. The policy places a part of the responsibility for dealing with the question of security of uranium supply on the utilities.

DOE will continue to monitor the state of the domestic uranium producing industry (including such items as reserves, exploration, production, employment, inventories, prices and revenues); procurement of domestic and foreign uranium; and foreign supply, demand, and marketing activities.

OPTIONS

There are several options as to means of control of foreign uranium, if and when it should be decided that some further action is necessary. Some principal options, the nature of these options, and a commentary on their advantages and disadvantages follow. The first two options could be pursued under the authorities contained in section 161v of the Atomic Energy Act. Most of the other options would require other authorization and would likely fall, at least in part, under the jurisdiction of agencies other than DOE.

1. Delay Removal of Restrictions. This approach would modify the planned stepwise removal of restrictions by extending the time period over which the total removal would be accomplished. By so doing, it would be possible for the removal to track more closely the anticipated growth in world uranium demands. In this procedure a level such as 30 or 40 percent might be held for some three to five years after which the levels could be increased again leading to complete removal, perhaps in the late 1980's.

2. Set Ceiling on Allowable Foreign Uranium. This approach is reflected in the approach taken by the legislation proposed by Senator Domenici. Under this option an upper limit on the use of imported uranium would be selected that would limit the potential dependence on foreign uranium, and which could be expected to maintain a viable domestic industry. This would have the advantage of acknowledging that there is undoubtedly some unacceptable level of imports, even if it appears doubtful that that level will be reached, and allowing all parties concerned to adjust themselves accordingly. This option, however, will likely receive considerable criticism from foreign uranium producer countries and is likely to be inconsistent with the General Agreement on Tariffs and Trade. Restrictions on import of uranium could impact on the potential for export of other U.S. products and on the ability of the U.S. to obtain foreign uranium in the future, if additional foreign uranium is needed. Such action could lead to actions to circumvent the restrictions, perhaps encouraging exporter countries to develop their own enrichment capacity and restrict the form in which their uranium could be exported. However, the national goal of being more self-sufficient in energy may warrant the consideration of this option because of the special importance of uranium.

A variation would be to seek voluntary limitations by the important exporting countries, principally Australia and Canada, on the amount of uranium that would be exported to the United States. Such arrangements could be made in conjunction with other matters of mutual interest in energy, including enrichment and non-proliferation that are of concern to the United States and the uranium exporting countries. Such arrangement would undoubtedly be difficult to accomplish and could involve complex legal questions which would have to be carefully investigated.

3. Tariffs. Control of imports has historically also been done by the use of tariffs that tend to equalize costs between foreign and domestic supplies. Imposition of tariffs would require the actions of organizations other than DOE (perhaps legislation) and would likely take considerable time to develop and implement. An affirmative finding to an investigation under Section 232 of the Trade Expansion Act of 1962 could provide the President with authority to impose a protective tariff

or other measure to restrict imports. The level of tariffs required to provide assured protection to the domestic industry might have to be fairly high, if they are to offset the potential cost differences that may prevail. A lower value tariff could reduce buyer incentives to purchase foreign uranium. The concept of floor price could be considered in establishing tariffs. Tariffs would increase costs of power to consumers and have negative impacts on U.S. enrichment business, perhaps even to domestic customers, if they chose to use foreign enrichment services to avoid tariffs.

4. Increase Domestic Uranium Requirements. This option would recognize that the problems of the U.S. industry are as much the result of decreasing expectation of uranium requirements as any other single factor. Consideration can be given to increasing the DOE enrichment plant tails assay so as to require the delivery of larger amounts of feed to produce a fixed enriched product. An increase from the current 0.20 % U-235 transaction enrichment tails assay to a level of 0.25 % would increase total U.S. requirements by almost 10 percent. At the current lower uranium prices an enrichment transaction tails assay higher than the current 0.20 % U-235 tails assay may appear reasonable, based on the classical relationships of natural uranium feed, separative work, and tails assay. This option, however, would need to be reviewed very carefully. A higher transaction tails assay will decrease separative work sales and could necessitate further reductions from planned enrichment complex production. Steps to reduce production, coupled with an early increase in the enrichment transaction tails assay, will essentially eliminate almost all of the flexibility to respond to any upward changes in demand and/or unexpected production losses. Moreover, past DOE studies have shown a higher transaction tails assay to result in significantly higher prices of separative work. This, at the very least, would mitigate the economic impact of the availability of low priced uranium on enriched uranium product costs and could result in significantly higher longer-term enriched uranium product costs to the consumer.

5. International Commodities Agreement. A means might be developed by which uranium would be subject to an international agreement which would involve the development of "buffer" stocks of uranium. Uranium would be purchased for the buffer stock at times of low prices and sold at times of high prices to mitigate price swings and maintain a market for producers. Alternatively, ore reserve banks, involving the purchase of uranium in the ground, could be established to provide financial relief and encourage exploration. Such agreements are generally difficult to develop as they must involve a number of producers and buyers and reconcile the interests of both groups. A significant financial commitment is required as purchases of uranium at times of low prices could easily involve several hundreds of millions of dollars per year. Such commodity agreements have been only partially successful for other commodities. It does offer, however, the means for developing a mutually acceptable plan for dealing with oversupply problems or shortages of a very important mineral commodity.

6. Develop Larger Uranium Stockpiles. The government could support the industry by reestablishing a purchase program to increase domestic stockpiles of uranium as a hedge against potential future supply problems, considering commercial and defense needs. These purchases would shore up the market and maintain production at higher levels. This option could require substantial funds for purchase of the uranium and also involve large carrying charges. Government re-entry into the market place could create distortions, if uneconomic operations are maintained whose production would not be needed for an extended period. Past studies of uranium held by the government have concluded that stocks are adequate for most contingencies and have focused on means to reduce government stocks.

CONCLUSIONS

There has been limited commitment to use of foreign uranium by U.S. uranium buyers, and the potential for additional delivery of foreign uranium is limited in the next several years, because of small needs for additional uranium during that period. However, there is a potential for further penetration of foreign uranium in the U.S. market place over the longer term, considering the low relative cost of some of the new foreign operations.

The industry is currently viable, though there are cutbacks in exploration and production and hence in employment. These actions have been the consequence of falling prices and lack of uranium buying activity, a reflection of the domestic near-term over supply situation. This situation is principally caused by reactor delays and cancellations, and the lack of new reactor orders, rather than loss of market to foreign uranium. Revitalization of the nuclear power industry is required to assure a healthy domestic uranium industry.

SEP 2 1982

Honorable Pete V. Domenici
Chairman, Subcommittee on Energy
  Research and Development
Committee on Energy and
  Natural Resources
United States Senate
Washington, DC 20510

Dear Mr. Chairman:

During a hearing on March 17, 1982, you asked for an update of our study, "The Domestic Uranium Industry and Imports of Uranium," dated February 23, 1981. The enclosed report, "Status of the U.S. Uranium Industry," dated August 1982, responds to your request. This report includes input from our Grand Junction Area Office, together with market survey and other information based primarily upon data gathered by the Energy Information Administration of the Department of Energy, and employed also for the annual publication, "Survey of United States Uranium Marketing Activity."

The enclosed report is intended to provide a factual analysis of the current status of the domestic uranium industry. I trust that it will meet your needs.

Sincerely,
Original signed by

Shelby T. Brewer
Assistant Secretary
  for Nuclear Energy

Enclosure

cc:
Honorable Wendell H. Ford
Ranking Minority Member

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Status of the U.S. Uranium Industry

August 1982

Office of Uranium Enrichment
& Assessment

U.S. Department of Energy

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I. LEGISLATIVE HISTORY

The domestic uranium mining industry has been protected historically by preventing or limiting the enrichment of imported uranium for domestic end use. The statutory basis for this protection appears in Section 161v of the Atomic Energy Act of 1954, as amended (Public Law 88-489), which provides:

> "That the [Atomic Energy] Commission, to the extent necessary to assure the maintenance of a viable domestic industry, shall not offer [enrichment] services for source or special nuclear materials of foreign origin, intended for use in a utilization facility within or under the jurisdiction of the United States. The Commission shall establish criteria in writing setting forth the terms and conditions under which services provided under this subsection shall be made available including the extent to which such services will be made available for source or special nuclear material of foreign origin intended for use in a utilization facility within or under the jurisdiction of the United States."

The purpose of this provision of the Act was to help assure that the viability of the U.S. uranium producing industry would be maintained during the transition from the purely Government market for defense purposes in the 1950s and early 1960s to an entirely commercial market. When this section of the Act was promulgated in 1964, it was a time of limited uranium demand for the commercial market, excess foreign supply, low uranium prices, and forecasts of high future requirements for uranium. The effect was a complete embargo of foreign uranium for domestic end use. In implementing this section of the Act, the Atomic Energy Commission (AEC) announced in the Federal Register on December 23, 1966 (31 FR 16479), that it would not agree to enrich foreign uranium intended for use in domestic facilities. However, the AEC said it would from time-to-time review the status of the domestic mining and milling industry to determine the need to continue the restriction.

The legislative history of the restriction indicates that the restriction was considered to be a temporary measure. The section-by-section analysis of the bill leading up to the Act indicates that the statutory direction to the AEC regarding the availability of enrichment services for foreign uranium was "flexible both as to the duration and degree of the restriction" and contained the following statement of purpose:

> "Accordingly, the language of the bill will permit the Commission to survey periodically the condition of the domestic and world uranium markets and to offer or refuse to offer its enrichment services on a basis which will assure, in its opinion, the maintenance of a viable domestic uranium industry". 2 US Code and Administrative News, p. 3135, 1964, 88th Cong (2d).

With the advent of an entirely commercial market and when it appeared that restrictions on foreign uranium could be eased without affecting the viability of the uranium industry, the AEC, after careful study and Congressional review, put into effect a plan for the gradual removal of restrictions on enrichment of imported uranium for domestic end use. The plan, which was announced in the Federal Register on October 25, 1974 (39 FR 38016), provided that in 1977 up to 10 percent of uranium furnished by an enrichment services customer for domestic end use could be of foreign origin. The amount would be increased to 15 percent in 1978, 20 percent in 1979, 30 percent in 1980, 40 percent in 1981, 60 percent in 1982, and 80 percent in 1983. Starting in 1984 there would be no restrictions.

The Federal Register announcement also stated:

> "It is not anticipated that any change will be required in the schedule now being established. However, the AEC will monitor the extent of importation of foreign uranium for domestic use and its effect on the viability of the domestic uranium producing industry and on the President's objective of achieving a national capability for energy self-sufficiency. For this purpose the Commission, in addition to continuing its present program of monitoring uranium exploration activity, resource development, production capability and the general uranium market situation, will also monitor purchase or other arrangements involving import of any material destined for enrichment in private enriching facilities. If the extent of domestic use of foreign uranium should impair or threaten to impair the common defense and security, the Commission will institute such measures as are deemed necessary." (39 FR 38016)

Information used in this study is from the latest data available to the Department of Energy. Certain information developed by the Nuclear Assurance Corporation, the Nuclear Exchange Corporation (Nuexco), and Nuclear Resources International was also used. Unless otherwise noted, quantities in this report will be given in short tons of U_3O_8.

II. U.S. URANIUM PRODUCING INDUSTRY

A. URANIUM RESOURCES

1. General

Extensive uranium exploration and development activities during the late 1960s and through the 1970s resulted in a considerable buildup in estimates of the Nation's uranium resources. The quantities of uranium reserves and potential resources, estimated annually to be available at various maximum forward production cost levels, rose gradually to a peak at the beginning of 1980. Since then, exploration efforts have diminished, and relatively few additions have been made to the U.S. uranium resource base. In addition, the amounts of uranium estimated to be available within specified production cost levels have dropped sharply, not because they have been lost (except minor amounts through production), but primarily because domestic uranium ore has become more expensive to mine and process into concentrate. Production cost increases are due not only to inflation, but also to additional environmental, health and safety requirements. The recent changes in estimates of uranium reserves and potential resources are discussed below.

DOE estimates and reports uranium resources as the quantities of uranium available at or below specified production cost levels, i.e., $15, $30, $50 and $100 per pound U_3O_8. The cost levels refer to "forward" production costs which are the operating and capital costs that would be incurred in the future production of uranium. Estimated quantities at any given cost level include resources in all lower cost categories. Expenditures made prior to the time of the estimation are excluded. For example, prior exploration costs are excluded in determining production costs for reserves, but future costs for exploration needed to develop potential resources are included.

The forward cost levels, therefore, should not be equated to prices nor should they be confused with economic recovery costs, which would include return on investment after taxes and which can range from 1.2 to 1.5 times the forward cost for reserves and 1.3 to 1.7 times for potential resources. The ratio for reserves depends largely on whether any mining and/or processing facilities are available for use in producing from a given reserve and on the extent to which such facilities have been amortized. "Economic recovery" costs, as considered herein, do not include previous exploration costs or future expenditures for replacement of reserves.

2. Reserves

Uranium reserves, as defined by DOE, are discovered resources in well-defined portions of uranium deposits. They are estimated on an engineering basis, using actual sample data, and they constitute the most assured source of future uranium production. Even so, some uncertainty exists as to the exact quantity of in-place material and its grade, so DOE expresses the reserves by probability distributions. Reserve quantities are a key focal point for mining companies in the formulation of policies regarding ongoing mine/mill operations and for planning capital expenditures for expanded or new production facilities.

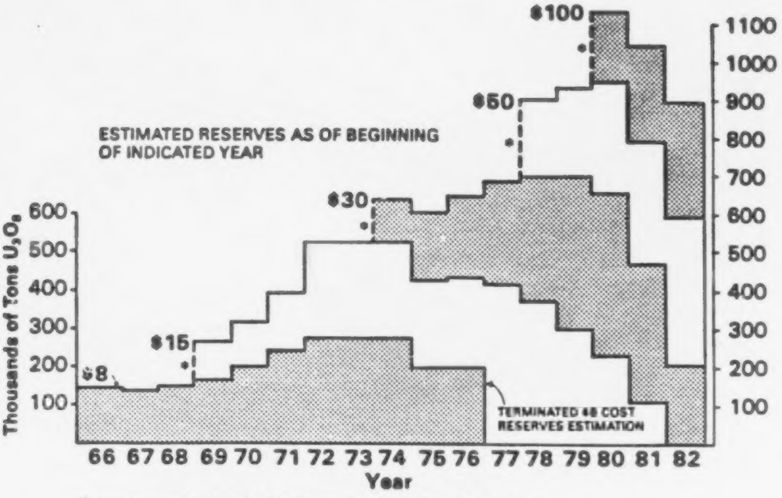
Figure 1 charts the historic buildup and recent decline in U.S. reserve estimates at the various production cost levels. For example, reserves estimated to be available at $15 (or less) per pound U_3O_8 production cost increased, through exploration and development, from 248,000 tons U_3O_8 in 1968 to 320,000 tons in 1974, but then declined so that as of January 1982, no reserves can be considered to be available at $15 per pound U_3O_8. The decline in the estimated quantity of reserves available at the various cost levels is due in part to depletion through mining of the higher grade ore, but mostly it is due to rising production costs, which have not been offset by sufficient development of new reserves.

Data from the January 1, 1982 reserves probability distributions are shown in Table I. Details of changes to the mean estimate during 1981 are shown in Table II. DOE reserve estimates include uranium recoverable by mining, with no adjustments for processing losses which may range from 5 to 15 percent.

3. Potential Resources

Potential resources remain to be found and developed. They are estimated on the basis of geologic inference and comprise those portions of the undiscovered uranium resource base that are believed to be producible under current technology at the specified forward cost levels. "Probable" potential resources include uranium estimated to occur in extensions to known deposits, or in undiscovered deposits within known geologic trends or areas of mineralization. "Possible" potential resources are estimated for favorable geologic areas within productive geologic formations and provinces--"productive" being defined as having reserves plus past production exceeding 10 tons U_3O_8. "Speculative" potential resources are estimated in geologically favorable rock units that have not been productive to date. DOE potential resource estimates include only uranium extractable by mining, with no adjustments for processing losses, which may range from 5 to 15 percent. Due to the considerable uncertainties associated with estimating uranium quanities in undiscovered ore deposits, potential resources are reported as probability distributions. Annual estimates of the portions of potential resources within the specified production cost levels since 1975 are shown in Figure 2. Although there have been some additions to potential resources in recent years through identification of new geologically favorable areas, the rapid rise in anticipated production costs has resulted in an overall decline in the potential resources.

As of January 1, 1982, the United States uranium potential resource data base included a total of 697 areas. Figure 3 shows the number of areas for which revisions or new assessments were made during 1981 through evaluation of data from the National Uranium Resource Evaluation (NURE) program and through



*Reserves were not previously estimated at the indicated cost levels.

Figure 1. Historical Changes in U.S. Uranium Reserve Estimates by Forward Cost Levels

TABLE I
URANIUM RESERVES OF THE UNITED STATES
AS OF JANUARY 1, 1982 1/
(in Short Tons U_3O_8)

Forward Cost Category	Mean	Probability Distribution Values 95 percentile 2/	5th percentile 2/
\$30/pound U_3O_8	205,000	184,000	230,000
\$50/pound U_3O_8 3/	594,000	528,000	679,000
\$100/pound U_3O_8 3/	894,000	780,000	1,020,000

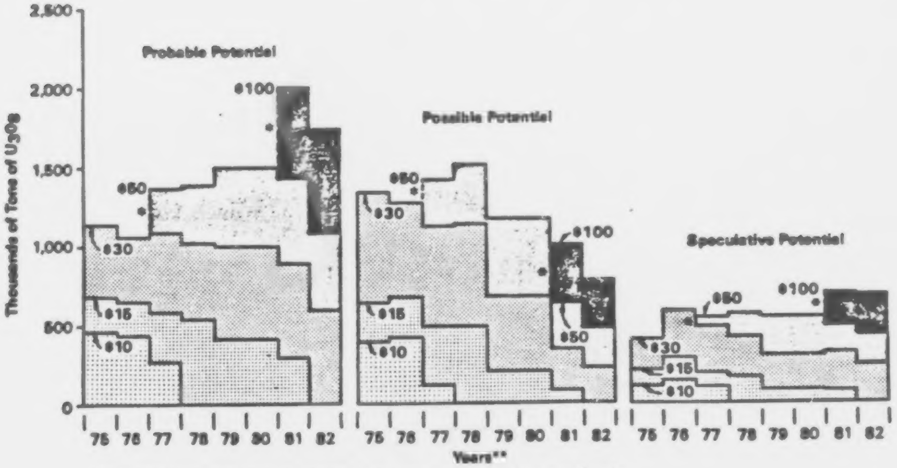
1/ Uranium resources are estimated quantities recoverable by mining. Losses due to processing may range from 5 to 15 percent.

2/ The 95 percentile indicates a 95 percent confidence in the existence of at least the amounts shown. The 5th percentile indicates a 5 percent chance of the existence of more than the amounts shown.

3/ Includes lower cost resource categories.

TABLE II
CHANGES IN URANIUM RESERVES DURING 1981
(in Short Tons U_3O_8)

Forward Cost Per Pound U_3O_8	$30	$50	$100
January 1, 1981 Reserves	470,000	787,000	1,034,000
New Properties	2,000	14,000	27,000
Reevaluation--Additions	6,000	3,000	7,000
Reevaluation--Substractions	(252,000)	(182,000)	(142,000)
Depletion-Production	(21,000)	(28,000)	(32,000)
January 1, 1982 Reserves	205,000	594,000	894,000
Net Change	(265,000)	(193,000)	(140,000)
Percent Reduction	56	25	14



*Potential resources were not previously estimated at the given cost levels.
**Estimates are as of beginning of year.

Figure 2. Historical Changes in U.S. Uranium Potential Resource Estimates by Forward Cost Levels

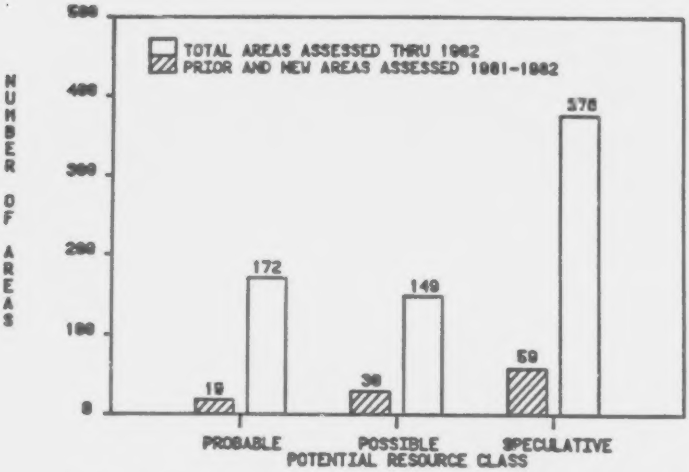


Figure 3. Number of Areas in the U.S. Uranium Potential Resource Base

new industry data. These changes involved 11, 20 and 16 percent, respectively, of the probable, possible and speculative resource areas.

As a result, new potential resources were added in 1981 to the \$50 to \$100 per pound U_3O_8 forward cost increment--approximately 75,000, 29,000 and 148,000 tons U_3O_8, respectively, in the probable, possible and speculative classes. Nevertheless, because of increases during the year in the costs of production, there were net reductions from January 1, 1981 estimates in potential resources at all forward cost levels. The mean estimates of potential resources in the probable class range from 596,000 tons U_3O_8 available at \$30 per pound to 1,740,000 tons available at \$100 per pound. These are 33 percent and 16 percent lower than comparable January 1, 1981 estimates. Estimates of possible potential resources range from 227,000 tons in the \$30 category (down 34 percent) to 784,000 tons in the \$100 category (down 22 percent). Speculative potential resources range from 236,000 tons in the \$30 category (down 24 percent) to 685,000 tons in the \$100 category (down 2 percent).

A summary of the potential uranium resources in the United States estimated by DOE as of January 1, 1982 is shown in Table III, using key values from the estimated probability distribution. As in the case of uranium reserves, estimated quantities of potential resources in the \$15 cost category are no longer significant enough to report.

4. Ability to Supply U.S. Nuclear Power Requirements

The uranium reserves plus probable potential resources at a 95-percent confidence level provide a reasonable basis for determining whether future requirements of U.S. nuclear power reactors can be met. At the \$30 forward cost category, the reserves plus probable potential resources amount to 420,000 tons U_3O_8, assuming a 15-percent processing loss; it is likely that the actual processing losses will be less than that amount. The 420,000 tons should be able to supply the lifetime requirements of 80 gigawatts of nuclear power electrical capacity, which are all reactors operating today, together with those reactors scheduled to begin operation over the next two years, assuming a 30-year operating life for the reactors.

At the \$50 forward cost category, the reserves plus probable potential resources at a 95-percent confidence level amount to 940,000 tons U_3O_8, assuming a 15-percent processing loss. As was the case with the \$30 cost category, the processing losses are likely to be less than 15 percent. The 940,000 tons should be able to support the lifetime requirements of about 170 gigawatts of nuclear power electrical capacity, a level which is not expected to be reached until well into the next century.

The above analysis does not include the use of foreign uranium to supply U.S. nuclear power reactors. To the extent that foreign-origin uranium is used, the U.S. reserves and potential resources will be able to supply the lifetime requirements of additional nuclear power reactors.

TABLE III
URANIUM POTENTIAL RESOURCES OF THE UNITED STATES
AS OF JANUARY 1, 1982 1/
(in Short Tons U_3O_8)

Forward Cost Category	Mean	Probability Distribution Values	
		95 percentile 2/	5th percentile 2/
$30/pound U_3O_8			
Probable	596,000	311,000	1,028,000
Possible	227,000	98,000	474,000
Speculative	236,000	144,000	542,000
Totals	1,059,000	574,000 3/	1,778,000 3/
$50/pound U_3O_8 4/			
Probable	1,080,000	581,000	1,770,000
Possible	473,000	213,000	934,000
Speculative	421,000	247,000	890,000
Totals	1,974,000	1,105,000 3/	3,186,000 3/
$100/pound U_3O_8 4/			
Probable	1,740,000	950,000	2,837,000
Possible	784,000	409,000	1,655,000
Speculative	685,000	384,000	1,382,000
Totals	3,209,000	1,829,000 3/	5,222,000 3/

1/ Uranium resources are estimated quantities recoverable by mining. Losses due to processing may range from 5 to 15 percent. In addition to the above resources, uranium that could be recovered by the year 2000 as a byproduct of phosphate and copper mining is estimated at 120,000 short tons.

2/ The 95 percentile indicates a 95-percent confidence in the existence of at least the amounts shown. The 5th percentile indicates a 5-percent chance of the existence of more than the amounts shown.

3/ The values for resources at the 95th and 5th percentiles are not directly additive because the estimates are only moderately correlated.

4/ Includes lower cost resource categories.

B. URANIUM EXPLORATION

1. Overall Efforts

The principal indicators of exploration activities are the annual total exploration expenditures and the annual total feet of surface drilling. Following the 1978 all-time high of about 48 million feet drilled and $315 million in total expenditures, exploration activities have dropped successively to lower levels each year. About 14 million feet were drilled in 1981, and total surface drilling in 1982 probably will be less than 10 million feet. Exploration expenditures in 1981 totalled $145 million, and $74 million are projected for 1982. In the late 1970s, exploration was being conducted in areas widespread throughout the United States with the dual objectives of developing reserves in more favorable areas and expanding into "frontier" areas where new uranium deposits might be discovered. Currently, with few exceptions, companies are doing minimal surface drilling, primarily to extend reserves in known deposits and to carry out assessment work required to hold lands.

2. Relation to Price

There appears to be a historical correlation between the "spot" uranium price and exploration activity. Figure 4 shows annual surface drilling, exploration expenditures, and the average Nuexco Exchange Value. Prices and expenditures have been converted to 1981 dollars through the use of the Wholesale Price Index for Industrial Commodities. The Nuexco Exchange Value, frequently referred to as the "spot" price, reflects the price at which some uranium transactions have taken place over the near term. The "spot" price appears to have a strong effect on industry exploration investment, as changes in the "spot" price appear to lead corresponding changes in exploration activity by about one to two years. Record high "spot" prices for uranium occurred in 1976 through 1978, while total exploration investments and surface drilling rose to record high levels in 1977 through 1979. Since 1978, the drop in exploration effort appears to have followed the decline in the "spot" price.

3. Domestic Exploration by Non-U.S. Companies

For the three years 1978-1980, uranium exploration expenditures by foreign companies in the U.S. have been only 6 percent less than the uranium exploration expenditures by U.S. companies abroad. These expenditures have been relatively balanced, despite high uranium discovery rates in foreign countries, because the laws of those countries typically limit foreign (e.g., U.S.) interests to a minor fraction of the total resource ownership. U.S. law permits foreign companies to own any uranium resources purchased or discovered in the United States, and it allows them to sell such uranium to any U.S. or non-U.S. buyer without any restriction on price or quantity.

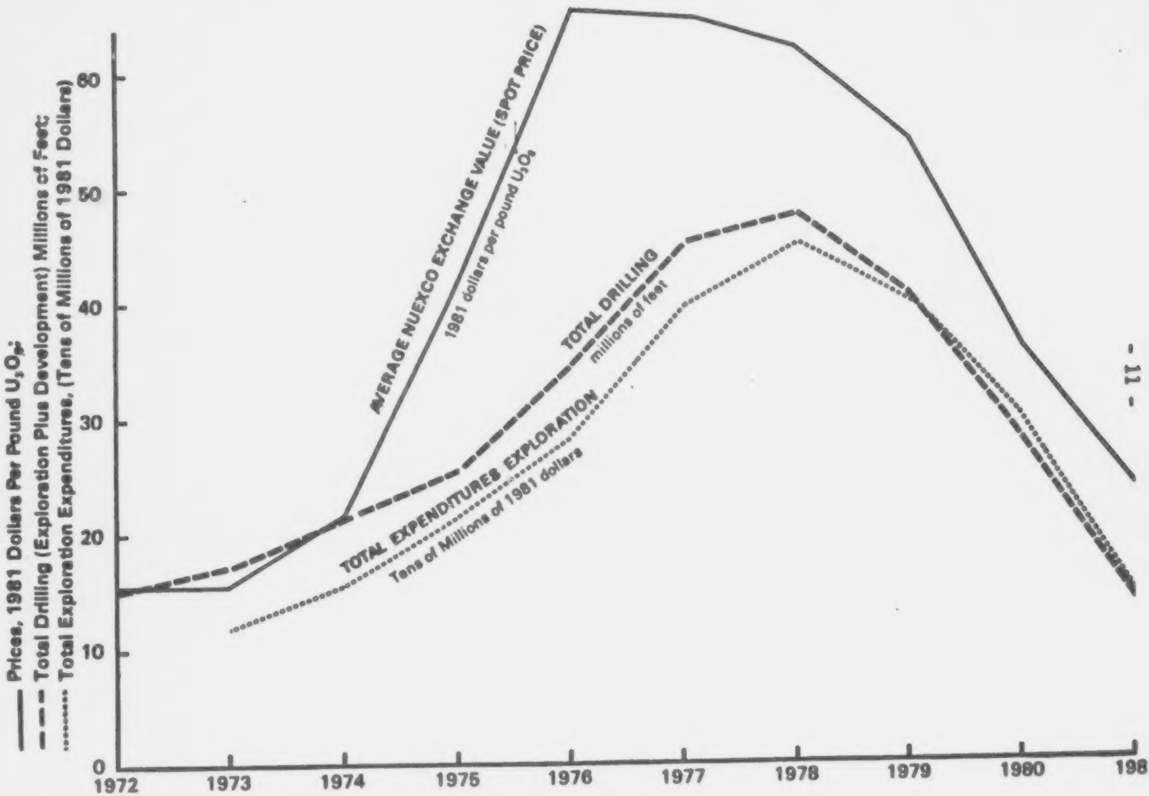


Figure 4. History of U.S. Exploration Activity & Average Uranium Spot Price

4. Uranium Reserves Addition Rates

The historical ratio of pounds of U_3O_8 added to ore reserves per foot of surface drilling, herein termed the "reserves addition" rate, provides one benchmark for estimating future exploration success. Such additions result from discovery of extensions to known ore deposits or the discovery of new deposits. Historical rates (in pounds per foot) are shown in Figure 5 as a function of average ore and are derived from net additions to reserves adjusted for production during the years 1975 through 1979, as compared with total surface drilling during the period 1974 through 1978.

The historical reserve addition rates for the overall United States (Figure 5) averaged 2 to 3 pounds U_3O_8 per foot of drilling for reserves in the grade range 0.12 to 0.09 percent U_3O_8, but were considerably lower (less than 1 pound per foot) for higher grades. This difference is because about 65 percent of the drilling carried out over the 1974-1978 period was in Texas, Wyoming, or new frontier areas, where the newly developed uranium deposits were mostly of much lower grades than the national average. The discovery rate has been higher than the national average in the Colorado Plateau, where most of the reserves with grades above 0.20 percent U_3O_8 have been developed and where most of the higher grade potential resources have been estimated. Overall uranium reserve addition rates have been decreasing in recent years as uranium deposits became more difficult to locate. Over the next 20 years, it is likely to cost about $9 per pound U_3O_8 to find uranium deposits in the United States and develop reserves from potential resources extractable at production costs of up to $50 per pound U_3O_8; the overall cost includes expenditures for acquisition, geologic investigation and drilling. Of course, successful companies may find and develop uranium at lower costs. Indeed, some already-discovered uranium (such as that announced recently in southern Virginia) has not been added to the DOE reserve estimate because the data are not fully evaluated or have not been released by the companies.

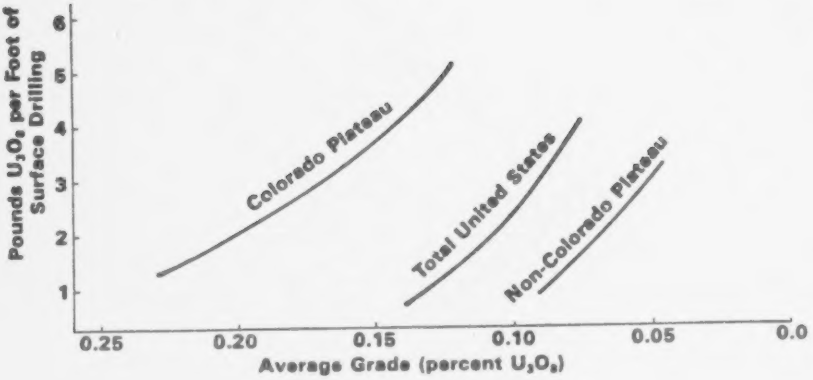


Figure 5. U.S. Uranium Reserve Addition Rate

C. URANIUM PRODUCTION ACTIVITIES

Total annual domestic production of uranium since 1973 is shown in Figure 6. Production in 1981 was 19,240 tons U_3O_8 in concentrate, and production for 1982 is expected to be about 13,000 to 14,000 tons--down about 38 percent from the 1980 high of 21,850 tons. This would represent the sharpest 2-year decrease in the history of the U.S. uranium industry. Conventional mining and milling production has declined markedly, while production has increased slightly from non-conventional sources such as solution mining and byproduct recovery from the processing of phosphoric acid and copper.

Recent production decreases are due to high inventories and slippage in uranium demand. Some producers are finding it more economical to fill delivery commitments by buying excess utility inventories than by mining and milling their own ore.

There has been extensive curtailment of mine and mill activities as shown by Table IV, which lists the mills, and their corresponding rated capacity, that have shut down since January 1, 1981. The rated capacity, in tons of ore processed per day, assumes a 7-day work week.

TABLE IV
MILLS THAT HAVE BEEN SHUTDOWN SINCE JANUARY 1, 1981

DATE SHUTDOWN	COMPANY	LOCATION	RATED CAPACITY in Tons per Day
June 1981	SOHIO-RESERVE	Seyboyeta, NM	1,600
July 1981	WESTERN NUCLEAR, INC.	Jeffery City, WY	1,700
November 1981	FEDERAL AMERICAN PART.	Gas Hills, WY	950
March 1982	ANACONDA MINERALS CO.	Bluewater, NM	6,000
May 1982	CONOCO-PIONEER NUCLEAR	Falls City, TX	3,400
May 1982	UNITED NUCLEAR	Church Rock, NM	3,000
June 1982	WESTERN NUCLEAR, INC.	Wellpinit, WA	2,000
			18,650

The 18,650 tons ore per day (tpd) rated capacity which has been shut down is approximately 31 percent of the total rated capacity of 52,900 tpd of the U.S. conventional mills as of January 1, 1981. In addition, two solution mines in Texas and two uranium byproduct plants in Florida have recently ceased operations, representing about 10 percent of non-conventional capacity.

As of June 1982, there were 17 conventional mills in operation (Table V). The combined nominal rated capacity of these mills is about 35,000 tpd. However, the present overall rate of utilization is 24,500 tpd or 70 percent of the current available capacity. Five mills (which includes some of the highest capacity plants) are operating at full capacity, while three of the mills are operating at about 20-percent capacity.

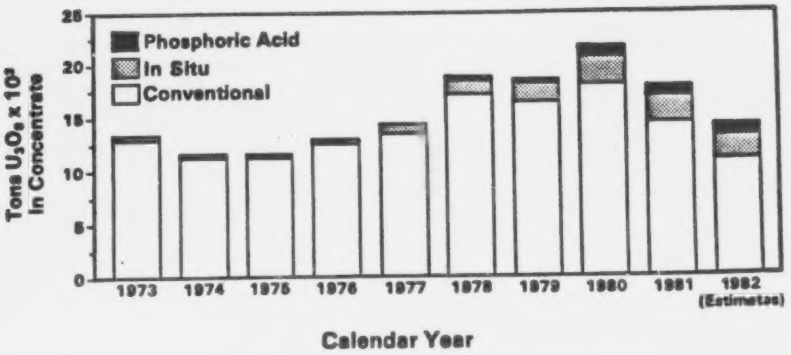


Figure 6. Annual U.S. Uranium Production

TABLE V
UTILIZATION OF CURRENT MILL CAPACITY

COMPANY	LOCATION	RATED CAPACITY in Tons per Day
ATLAS MINERALS	Moab, UT	1,400
BEAR CREEK URANIUM	Powder River, WY	2,000
CHEVRON RESOURCES	Panna Maria, TX	2,500
COTTER CORPORATION	Canon City, CO	1,200
DAWN MINING COMPANY	Ford, WA	450
ENERGY FUELS NUCLEAR	Blanding, UT	2,000
EXXON MINERALS	Powder River, WY	3,200
HOMESTAKE MINING	Grants, NM	3,400
KERR McGEE NUCLEAR	Grants, NM	6,000
UNION ENERGY	Red Desert, WY	3,000
PLATEAU RESOURCES	Hanksville, UT	750
PATHFINDER MINES	Gas Hills, WY	2,500
PATHFINDER MINES	Shirley Basin, WY	1,700
PETROTOMICS	Shirley Basin, WY	1,500
RIO ALGOM	La Sal, UT	750
UNION CARBIDE	Uravan, CO	1,300
UNION CARBIDE	Gas Hills, WY	1,400
TOTAL		35,050
JUNE 1982 RATE (in Tons per Day)		24,490
PERCENT UTILIZATION		70

In order to minimize costs and still meet continued requirements, producers have had to cut employment, reduce operations (in many cases from 7 to 4 days), and mine and process as high a grade of ore as possible. Open-pit and underground mining operations have also undergone widespread curtailment; since early 1981, over 10 major mines and many more smaller mines have shut down or reduced operations. During 1980, about 390 mines reported uranium production; during 1981, this number dropped to 260 mines. It is estimated that 215 mines will produce uranium in 1982.

A major portion of the investments made during the late 1970s and early 1980s in mining and milling facilities has resulted in no production or in production rates much lower than those for which the facilities were intended. A partial list of recent unfulfilled capital projects is shown in Table VI. The total investment for these is estimated at over $500 million. Incompleted underground mine facilities will either be maintained through pumping or allowed to flood (to be later pumped out), at the risk of being lost altogether. Open-pit mine operators who have been forced to shut down are faced with the possibility of investing money partially to restore the land to meet environmental regulations, thus covering up ore which they hope to mine at a later date. Not only have the original expenditures resulted in no monetary returns, but considerable additional expenditures will be required to operate these facilities in the future.

Stabilization of the tailings at the shutdown mills will also have to be considered, although it is not certain at present what action will be required. The extent of reclamation work required is site-specific and will depend on whether a given mill will be started up in the future and whether an environmental problem associated with the tailings has already been identified.

TABLE VI
UNFULFILLED MAJOR CAPITAL PROJECTS

TYPE OF PROJECT	CURRENT STATUS	NUMBER OF PROJECTS
New mill	On indefinite standby; never has operated	1
Mill expansion or renovation	Operating at 50-percent capacity or less	3
Mill expansion	Mill shut down	2
Deep mine shaft partially or completely sunk	Production postponed indefinitely	10
Other major primary development work	Production postponed indefinitely	10
Acquisition, exploration and development of major ore deposits	Facility construction and production postponed indefinitely	12

D. INDUSTRY CHARACTERIZATION

For the purpose of domestic uranium industry characterization, companies have been subdivided into three classes. "Class 1" companies were, in 1980, operating uranium producing facilities with adequate supporting resources. However, many of these have been since shut down. "Class 2" companies had made commitments to develop mines or construct processing facilities. "Class 3" companies have sufficient reserves to justify current construction of production facilities, but have not yet made a commitment to construct. Companies have been characterized further by the major type of company activity or source of revenue. Categories include Oil and Gas (OG), Mining (MG), Conglomerate (CO), and Utility (UT). The mix of companies has changed over the last decade as new companies entered the uranium business in response to increasing prices and prospects for expanding markets.

Table VII provides a listing and profile of companies involved in uranium resource development and production. Where appropriate, their parent organizations have been identified. Also indicated are the 1979 gross sales and uranium sales for the companies, as well as the type of uranium operation in which they are involved, i.e., open-pit mining (OP), underground mining (UG), in situ leaching (SL), or byproduct of phosphoric acid or copper production (BY). Since 1980, many companies have cut back or shut down all or part of their exploration, mining and/or milling activities. Such companies are also noted in Table VII. A number of companies in the uranium business are also involved in foreign uranium activities, or in other domestic or foreign activities, as shown in Table VII.

TABLE VII. U.S. URANIUM COMPANY PROFILE

Company Name	Type	1979 Gross Sales (millions $)	1979 Uranium Sales (millions $)	Type of Uranium Operation	Cut Back Since March 1981	Shut Down or Suspended Since March 1981	Comments	Foreign Uranium Operations	Other Operations	
									Domestic	Foreign
CLASS 1 (IN 1980)										
ARCO (Anaconda Minerals Co.) (also Class 2)	OG	>1000	> 50	UG, OP		X	Shut down all operations.		X	X
Atlas Minerals Corp.	MG	> 10	> 10	UG	X		Closed several mines; cut back mill operation.		X	X
Chevron (Chevron Resources Co.)	OG	>1000	> 10	OP					X	X
Cobb Nuclear	MG	> 10	< 10	UG		X	Shut down.			
Conoco (also Class 2, 3)	OG	>1000	> 10	UG, OP		X	Shut down Texas mill and mines; suspended New Mexico development.	X	X	X
Commonwealth Edison (Cotter Corp.)	UT	>1000	> 10	UG, OP	X		Cut back mill; suspended open-pit development.	X	X	
Dawn Mining Co. (Newmont Mining Corp.)	MG	> 100	< 10	OP	X		Plan to shut down within 1 year.		X	X
Energy Fuels Nuclear, Inc.	MG	> 10	0	UG			Began operations in 1981; have since cut back.			
Everett Minerals Corp.	MG	< 10	< 10	SL			Will shut down in 1983 unless can obtain contract.			
Exxon Corp. (also Class 3)	OG	>1000	>100	UG,OP	X		Shut down underground mine; cut back open pit and mill.	X	X	X
Federal Resources Corp. (Federal-American Partners)	MG	> 10	> 10	OP		X	Shut down all operations.	X	X	X
Freeport Minerals (Freeport Uranium Recovery Corp.)	MG	> 100	< 10	BY					X	X
Gardinier, Inc.	MG	> 100	< 10	BY		X	Shut down.	X	X	X
General Electric/Utah International/ Cogema (Pathfinder Mines Corp.)	CO	>1000	> 10	OP	X		Cut mine/mill production.	X	X	X
Getty Oil (Petrotomics)	OG	>1000	> 10	OP	X		Cut mill operations.	X	X	X
Gulf Oil	OG	>1000	> 10	UG	X		Closed Marianne Lake; cut back Mt. Taylor operation.	X	X	X
Homestake Mining	MG	> 100	> 10	UG, OP	X		Closed several mines; cut back mill production.	X	X	X
International Energy Co.	MG	< 10	< 10	SL						
Kerr-McGee Corp. (also Class 3)	OG	>1000	>100	UG, OP	X		Closed several mines.		X	X
Mobil Corp. (also Class 2)	OG	>1000	< 10	SL	X		Delayed New Mexico project by 8 years.		X	X
New Mexico and Arizona Land Co.	MG	< 10	< 10	UG		X	Abandoned share of New Mexico mines.		X	
Niagara Mohawk	UT	> 100	> 10	SL						
Pioneer Corp. (also Class 3)	OG	> 100	> 10	OP		X	Closed Texas mill; delayed Colorado/Utah operations.		X	

TABLE VII. U.S. URANIUM COMPANY PROFILE (Continued)

Company Name	Type	1979 Gross Sales (millions $)	1979 Uranium Sales (millions $)	Type of Uranium Operation	Cut Back Since March 1981	Shut Down or Suspended Since March 1981	Comments	Foreign Uranium Operations	Other Operations	
									Domestic	Foreign
CLASS 1 (IN 1980)										
Ranchers Exploration and Development Corp.	CO	> 10	> 10	UG		X	Ceased all uranium operations	X	X	X
Reserve Oil and Min.	MG	> 10	> 10	OP		X	Closed down mill			
Rio Tinto Zinc/Rio Algom, Ltd. (Rio Algom Mines, Ltd.)	MG	>1000	> 10	UG	X		Operating at 50% of capacity	X	X	X
Union Pacific Corp. Rocky Mtn. Energy Co. (Bear Creek Uranium Co.) (also Class 3)	CO	>1000	< 10	OP					X	
Standard Oil Co. (SOHIO)	OG	>1000	< 10	OP		X	Closed down mill and mines		X	X
Solution Engineering, Inc.	MG	< 10	< 10	SL						
TVA	UT	>1000	0	UG,OP	X		Curtailed or delayed several projects		X	
UNC Resources	CO	> 100	> 50	UG		X	Shut down mill and mines.	X	X	X
Union Carbide Corp.	CO	>1000	> 50	UG, OP	X		Operating at 50% of capacity.	X	X	X
Union Oil Co. (Union Energy Mining)	OG	>1000	> 10	UG	X		Started Wyoming mill in 1981; operating at two thirds capacity.		X	X
Uranium Resources, Inc.	MG	< 10	< 10	SL				X		
U.S. Steel Corp.	CO	>1000	> 10	SL				X	X	X
Phelps Dodge (Western Nuclear, Inc.)	MG	>1000	> 10	UG, OP	X		Closed Wyoming mill.	X	X	X
Westinghouse Elec. Corp. (Wyoming Minerals) (also Class 2,3)	CO	>1000	> 10	SL	X		Ceased New Mexico operation; shut down a Wyoming solution mine.	X	X	X
CLASS 1 TOTALS:										
OG	11	>1000—19	>100— 2	OP— 9	6	4		4	11	10
MG	16	> 100— 7	> 50— 3	UG— 9	5	5		6	9	8
CO	7	> 10— 5	> 10—17	UG, OP— 9	3	2		6	7	6
UT	3	< 10— 6	< 10—15	BY— 2	2	0		1	2	0
				SL— 8						
	37	37	37	37	16	11		17	29	24
CLASS 2 (IN 1980)										
Amax Mining Co.	MG	> 100		BY			Went into production in 1981.		X	X
Bokum Resources	MG	> 10		UG		X	Mill built; shaft sunk; but operations delayed indefinitely.			
Standard Oil of Indiana (Cyprus Mines Corp.)	OG	>1000		OP		X	Suspended operations.		X	X

TABLE VII. U.S. URANIUM COMPANY PROFILE (Continued)

Company Name	Type	1979 Gross Sales (millions $)	1979 Uranium Sales (millions $)	Type of Uranium Operation	Cut Back Since March 1981	Shut Down or Suspended Since March 1981	Comments	Foreign Uranium Operations	Other Operations	
									Domestic	Foreign
Earth Sciences, Inc.	MG	< 10		BY		X	Shut down operations			X
International Minerals and Chemical Corp.	MG	>1000		BY	X		Shut down one processing plant		X	X
Nuclear Development Co.	MG	< 10		SL		X	Operations postponed			
Nuclear Dynamics, Inc.	MG	< 10		SL		X	Suspended operations			
Phillips Petroleum Co.	OG	>1000		UG		X	Suspended operations		X	X
Consumer Power (Plateau Resources, Ltd.)	UT	>1000		UG			Mill has gone into operation		X	
Power Resources Corp.	MG	< 10		SL		X	Suspended operations			
Simplot Co.	MG	> 10		BY		X	Suspended operations		X	
Sunoco Energy Development Co.	OG	>1000		SL	X		Cut back exploration		X	X
CLASS 2 TOTALS:										
OG	3	>1000— 5		OP— 1	1	2			3	3
MG	8	> 100— 1		UG— 3	1	6			3	3
CO	0	> 10— 2		SL— 4						
UT	1	< 10— 4		BY— 4					1	
	12	12		12	2	8			7	6
CLASS 3 (IN 1980)										
Cleveland-Cliffs	CO	>1000					Postponed operations		X	X

E. INDUSTRY EMPLOYMENT

The changes in the number and type of people involved in uranium activities provide an indicator of the status of the industry. Estimated total uranium industry employment (Table VIII) rose from around 6,600 in 1973 to a peak of 22,200 in 1979, and then fell to about 13,700 in 1981. An additional loss of at least 2,000 employees is expected for 1982, which will result in a total drop in employment of 10,500 employees since 1979. The greatest relative change is occurring in the exploration sector. Further, in 1981 and early 1982, far fewer people were employed in the highly specialized fields of shaft-sinking and other primary development functions than in past years. Employment in solution mining activities and byproduct operations remained relatively constant, but these activities currently employ only about 10 percent of the total uranium mining and milling manpower force; the employment for solution mining and byproduct operations is included in the "Mining" line of Table VIII. The "Exploration" employment for 1981 is an estimated amount.

TABLE VIII
EMPLOYMENT IN THE U.S. URANIUM INDUSTRY

	1973	1974	1975	1976	1977	1978	1979	1980	1981
Exploration	1,557	1,697	2,049	2,793	4,140	4,449	4,066	3,370	2,300
Mining	3,516	3,928	5,386	7,603	11,453	13,338	14,649	13,298	8,984
Milling	1,522	1,668	2,237	2,727	3,175	3,615	3,476	3,251	2,367
Total	6,595	7,293	9,672	13,123	18,768	21,402	22,191	19,919	13,651

Most of the uranium is produced in the states of New Mexico, Wyoming, Texas, Colorado, Utah, Washington, and Arizona--areas which also normally employ mining, processing and exploration personnel in other mineral activities. However, during 1981 and 1982, there have been widespread slowdowns, accompanied by extensive personnel layoffs, in virtually every mineral and mineral fuel industry, notably coal, oil, gas, precious metals (gold and silver), copper and other base metals. Thus, it is becoming much more difficult for displaced uranium workers to find jobs within their field of expertise than in the past, when there were usually activities in the other mineral commodities in the western states.

A skilled work force is needed for successful uranium exploration, mining and milling operations and, given the low level of domestic uranium activity projected over the next five or six years, it will take several years to replace those people who have left the industry.

F. INDUSTRY PRODUCTIVITY

1. General

Two types of manpower productivity are discussed herein to obtain an indicator of the relative year-by-year production costs of the industry. The first type, the tons of ore mined and processed from conventional mines and mills, provides a relative measure of manpower efficiency. The second type, the tons U_3O_8 (in uranium concentrate) actually produced, additionally considers grades of ore mined and processed, as well as the recovery efficiency of the uranium mills.

2. Productivity Based on Ore Handled

Mining productivity dropped from a little over 1,800 tons of ore produced per man-year in 1973 to 1,000 in 1977, then rose to about 1,200 tons in 1978 and 1979, and further increased to 1,400 tons in 1980 and 1981. The decrease in mining productivity through 1977 resulted from increasing depths of open-pit mining, combined with a sharp increase in inexperienced miners requiring on-the-job training. Since 1973 there has also been a relative increase in the number of supporting technical and staff personnel needed to handle Federal and State environmental, health and safety regulations. Mining productivity increases since 1980 resulted through general cutbacks in the less efficient, higher cost operations and retention of the most highly skilled personnel.

Overall milling productivity, in terms of tons of ore fed to process, decreased from 4,500 tons per man-year in 1973 to 3,300 tons in 1976, but then rose to 5,000 tons in 1979, and up to 6,100 tons in 1981. The overall increase in milling productivity is attributed largely to newer, more efficient mills coming on-stream and to the expansion of some existing mills with the attendant economies of scale. In the last three years, some of the older and less efficient mills have ceased operations.

3. Productivity Based on Concentrate Produced

Considering the tons U_3O_8 in concentrate actually produced from mines and processed ore, which also reflects the reduced grade of ores processed, the overall productivity of the uranium industry (Figure 7) declined from 2.6 to 1.1 tons U_3O_8 produced per man-year from 1973 to 1977. However, during the 1978-1981 period, the productivity based on uranium produced in concentrate has climbed back to 1.7 tons U_3O_8 produced per man-year, as a result of the mining of high-grade ore and gains in overall mine and mill labor utilization, but at the expense of decreased production and widespread labor cutbacks. Recent utilization (and depletion) of stockpiled ore has also contributed to the higher productivity.

Future overall productivity, in terms of uranium produced in concentrate from conventional mines and mills, can generally be expected to decrease.

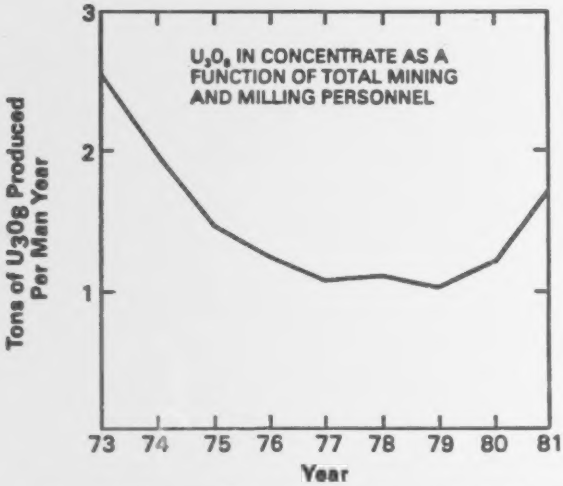


Figure 7. Productivity of Conventional U.S. Uranium Operations

Mining productivity will probably drop as ore is produced at progressively greater depths. Advances in milling productivity through utilization of newer plants may be offset by increasingly lower grade ores and additional labor to satisfy environmental regulations. There are no likely changes in the quality (grade) of the resource base that can be expected to improve the situation materially. The state of technology of the conventional uranium mining and milling operations is quite advanced and further near-term improvements are unlikely.

One exception, however, may lie in the greater utilization of solution mining (in situ) methods. Production via these techniques still comprises a minor portion of total uranium produced, and historically such operations have been restricted to a few localities with certain favorable geologic conditions. Although this technology is relatively new in the uranium industry, many companies are investigating possibilities of solution mining, especially in larger production units, which could materially advance U.S. uranium productivity, as solution mining uses less labor than conventional uranium production methods. Since solution mining commonly results in an overall recovery of in-place uranium of 25 to 35 percent less than that obtained from conventional mining and milling methods, extensive use of solution mining methods could result in some loss of uranium resources.

G. INDUSTRY CAPITAL INVESTMENT

During the latter part of the 1970s there was a steady and substantial increase in the uranium industry's capital expenditures for exploration, and for mining and milling facilities, reaching $800 million in 1979 (Table IX). Mining and milling expenditures rose slightly in 1980, while exploration expenditures decreased. In 1981, there was a substantial decrease in total capital investment to $416 million, and expenditures planned for 1982 and and 1983 will be at their lowest level since the early 1970s (the 1982 and 1983 expenditures were estimated as of January 1982).

Most of the 1980 and some of the 1981 expenditures were made to complete capital projects previously planned, budgeted, and already underway. Mill capital expenditures for 1981, and those planned for 1982 and 1983, are related primarily to environmental protection and, to a lesser extent, solution mining operations. No new conventional mills are under construction or planned for the near future. The values and trends for annual capital investment can be obscured by inflation, so that 1981 and earlier actual expenditures have been expressed in 1981 dollars in Table IX.

TABLE IX
URANIUM INDUSTRY CAPITAL EXPENDITURES
(in Millions of Dollars)

	Actual Dollars (with 1981 Dollars in Parentheses)							Planned	
	1975	1976	1977	1978	1979	1980	1981	1982	1983
Exploration	122(184)	171(245)	258(351)	314(383)	316(372)	267(294)	145	74	64
Mine	124(187)	200(286)	325(442)	271(331)	282(333)	273(300)	212	105	90
Mill	22(33)	55(79)	167(227)	156(190)	203(240)	242(266)	59	23	10
Total	268(404)	426(610)	750(1020)	741(904)	801(945)	782(860)	416	202	164

H. COST INCREASES

Over the last several years the cost of producing uranium in the U.S. has increased considerably. One indicator of rising costs is the Wholesale Price Index for Industrial Commodities. As shown in Figure 8, costs from 1973 to 1981 have more than doubled. In view of generally lower ore grades, and increased health and safety regulations, uranium production costs probably have increased even more rapidly. Another concern with respect to future costs lies in the uncertainty of the expenditures that will be required to satisfy environmental regulations dealing with mill tailings reclamation.

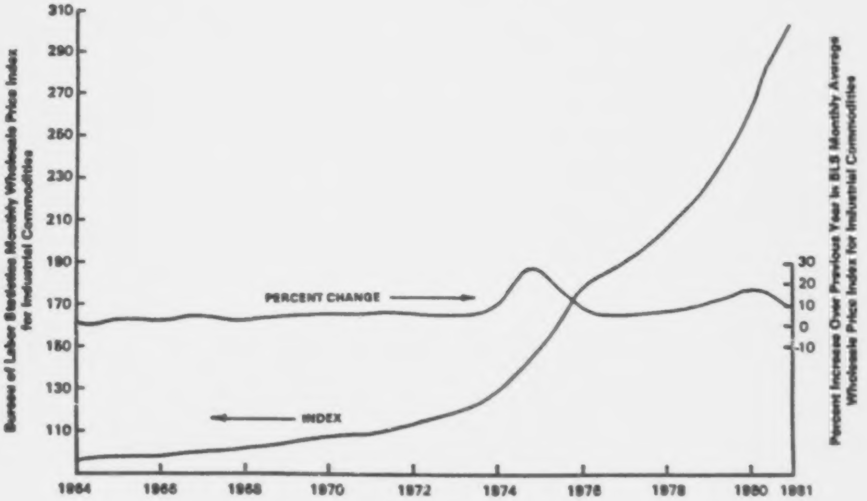


Figure 8. Wholesale Price Index for Industrial Commodities

I. INDUSTRY REVENUES

A rough measure of the value of sales commitments (as discussed in Section IV.A) of U.S. producers through 1987 can be obtained by assuming that deliveries will be at the reported average contract prices for uranium committed to domestic buyers. On this basis, it is estimated that revenues from sales were over a billion dollars in 1981, and will continue to exceed a billion dollars over the next five years as shown in Table X. The values are subject to change pending developments in contracting and settlements of market price contracts. Moreover, unfilled uranium requirements that have been identified by U.S. uranium users could add $300 to $500 million per year to producers' revenues in the mid 1980s.

TABLE X
U.S. URANIUM PRODUCER REVENUES

	U.S. Uranium Commitments* (in Short Tons U_3O_8)			Average Domestic Contract Price in Year-of-delivery Dollars* (in $ per pound U_3O_8)	Revenues (in Millions of $)
Year	Domestic	Foreign	Total		
1981	16,300	2,200	18,500	32.20**	1,190
1982	12,900	1,900	14,800	38.15**	1,130
1983	12,800	1,400	14,200	43.10	1,220
1984	12,300	1,000	13,300	50.45	1,340
1985	11,700	800	12,500	60.20	1,500
1986	10,800	600	11,400	51.35	1,170
1987	10,000	600	10,600	52.05	1,100

* The uranium commitments and average prices are those reported by uranium buyers.

** Includes market price settlements.

III. MARKET OUTLOOK

A. URANIUM DELIVERY COMMITMENTS

1. Quantities

In response to DOE market surveys, U.S. uranium users (i.e., utilities and reactor manufacturers) are asked to provide the quantities of their purchase commitments from U.S. uranium producers, and whether the purchase commitments are "firm", to be delivered from "captive" sources, to be procured under an "optional" purchase arrangement, or are under litigation. The "firm" category includes those commitments that the uranium users believe are most likely to be delivered under contractual provisions. However, some contracts under the "firm" category contain clauses which permit their cancellation by either the user or the uranium producer if the cost of production or price does not meet certain conditions. The "captive" category includes those delivery commitments from properties under the control of the uranium user. An "optional" purchase arrangement is one which can be firmed up at the user's or seller's option. Delivery commitments for contracts "under litigation" are included unless it appears that the uranium has not been or clearly will not be delivered.

For these four categories, Figure 9 shows the distribution of the 1982-1990 sales commitments as of January 1, 1982. Table XI lists the total reported annual uranium sales commitments over the 1982-1990 period for the data shown in Figure 9. Table XI also shows the sales commitments of U.S. producers to foreign buyers. The sales commitments decrease with time because users have not firmed up commitments in the later years. This pattern has been seen in the results of every uranium market survey in the past, and one may be confident that deliveries to U.S. and non-U.S. buyers will increase in these later years.

TABLE XI
ANNUAL URANIUM SALES COMMITMENTS
U.S. URANIUM PRODUCERS TO U.S. URANIUM USERS
(in Short tons U_3O_8)

Year of Delivery	To U.S. Buyers	To Non-U.S. Buyers
1982	12,900	1,900
1983	12,800	1,400
1984	12,300	1,000
1985	11,700	800
1986	10,800	600
1987	10,000	600
1988	9,500	500
1989	9,300	500
1990	8,500	500

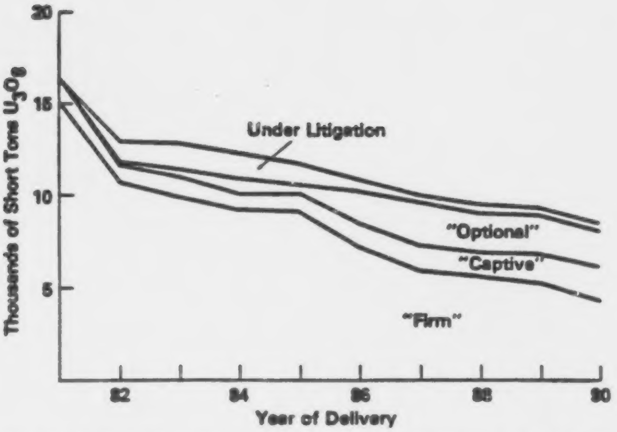


Figure 9. Uranium Delivery Commitments. U.S. Uranium Producers to U.S. Uranium Users

2. Prices

During the period 1973-1981, the average price per pound of U_3O_8 for sales from U.S. producers to U.S. buyers, in year-of-delivery dollars, increased from $7.10 to $32.20 as shown in Table XII.

TABLE XII
HISTORICAL TREND OF AVERAGE U.S. URANIUM PRICES
(Year-of delivery Dollars)

Year	Dollars per Pound U_3O_8
1973	7.10
1974	7.90
1975	10.50
1976	16.10
1977	19.75
1978	21.60
1979	23.85
1980	28.15
1981	32.20

Future prices for uranium under contract as of January 1, 1982, as reported to DOE, are shown in Table XIII. Also shown are the percentages of material under contract price arrangements covering the price data presented in the table. The remainder is in market price contracts or in captive production.

TABLE XIII
AVERAGE U.S. CONTRACT PRICES & MARKET PRICE SETTLEMENTS
(as of January 1, 1982)

Year	$ per Pound U_3O_8 (year-of-delivery Dollars)	Percentage of Procurement Under Contract Price Arrangements
1982	38.15*	74*
1983	43.10	89
1984	50.45	49
1985	60.20	45
1986	51.35	32
1987	52.05	37
1988	53.10	59
1989	58.35	61

* Includes settlements of market price contracts

B. URANIUM INVENTORIES AND UNFILLED URANIUM REQUIREMENTS

1. Uranium Inventories

Figure 10 illustrates the enriched and natural uranium inventories held by U.S. utilities and reactor manufactures for the 1972-1981 period. Prior to the 1979 survey, data on the enriched uranium inventories held by these users were not requested, and there is no basis for providing any information on the amount of these inventories.

Prior to this year's survey, DOE requested information on the U_3O_8 and natural UF_6 inventories and the inventory of enriched uranium not yet inserted in a reactor to which a company had title. We always intended that respondents include material on hand at their facilities, in off-site storage, at conversion plants, and in storage at DOE and elsewhere. To clarify our intent, this year's questionnaire specifically requested that uranium inventory at all of these sites be included in the response. Thus, the inventories shown for the end of 1981 may include uranium--especially natural uranium--that was not reported in answers to previous surveys.

As seen in Figure 10, natural uranium inventories have grown steadily since 1972. Much of this growth is to be expected since the number of operating nuclear power reactors has grown since then. At the end of 1981, the natural uranium inventory amounted to 51,200 tons of equivalent U_3O_8--about 3 years of forward coverage.

The end of 1981 enriched uranium inventory amounted to 11,200 tons of equivalent U_3O_8, which is a reduction of 7,100 tons during the year. The 11,200 tons is less than 1 year's forward coverage.

The 1982 survey asked uranium users to indicated whether their inventory levels were excessive, about right, or less than desirable. Of those uranium users who responded to this part of the questionnaire, an average of 17 said their natural uranium inventories were excessive, 11 said they were about right, and 1 said its inventories were low. A DOE-sponsored study indicates that, in terms of months of forward coverage of equivalent U_3O_8, utilities desire about 13 months of natural uranium inventory, which is considerably less than the current 3 years of forward coverage.

Regarding enriched uranium inventories, 5 utilities responded to the DOE survey that their inventories were excessive, 16 said they were about right, and no utility said that its inventories were low. The aforementioned DOE-sponsored study indicates that an enriched uranium inventory level of about 10 months is desired, which is in good agreement with the enriched uranium forward coverage indicated by the DOE market survey.

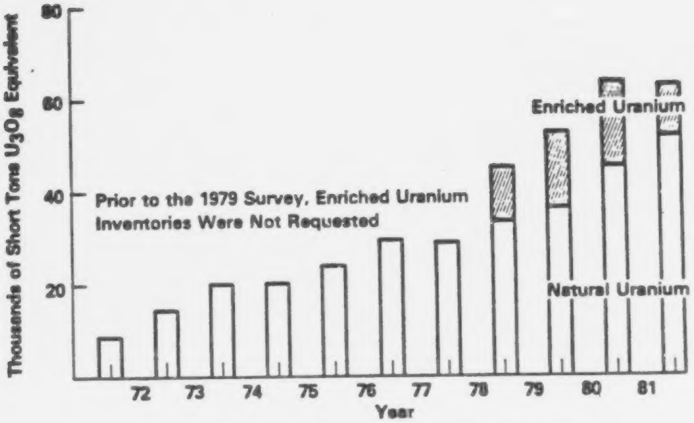


Figure 10. Uranium Inventories Held by U.S. Uranium Users

2. Unfilled Uranium Requirements

Unfilled requirements are that portion of utilities' total uranium requirements remaining after their procurement arrangements and use of their uranium inventories are considered. Table XIV lists the unfilled requirements for reactors in operation, under construction, or on order that U.S. utilities reported in the January 1982 survey. Cumulative unfilled requirements for the 1982-1990 period totalled 42,100 tons U_3O_8 as of January 1, 1982. These unfilled requirements were reported by 38 U.S. utilities.

TABLE XIV
ANNUAL UNFILLED U.S. URANIUM REQUIREMENTS

Year	Short Tons of U_3O_8
1982	300
1983	1,600
1984	2,600
1985	3,100
1986	4,300
1987	5,400
1988	6,200
1989	9,100
1990	9,500

C. NON-U.S. URANIUM USAGE

1. Historical Procurement and Usage

Table XV presents the pattern of contracting for foreign-origin uranium by domestic users based on a review of existing contracts with those made initially. Also shown are actual deliveries to domestic users in those years.

TABLE XV

Contracting by U.S. Buyers
Foreign-Origin Uranium for Domestic End-Use

Year	New Commitments		Actual Deliveries
	No.	Tons U_3O_8	Tons U_3O_8
1970	1	2,100	0
1971	0	0	0
1972	2	7,700	0
1973	1	1,100	0
1974	2	10,800	0
1975	5	4,800	700
1976	2	800	1,800
1977	1	1,800	2,800
1978	2	800	2,800
1979	1	800	1,800
1980	1	2,300	1,000
1981	4*	4,800*	3,300**
	22	38,800	14,300

*Not included in this total are 9,700 tons U_3O_8 that foreign suppliers will deliver to U.S. companies through litigation settlements. This represents 68 percent of the total 1981 procurement of foreign uranium.

** This includes material delivered under litigation settlements.

As shown in Table XVI, the actual deliveries of foreign-origin uranium to the DOE enrichment plants by U.S. uranium buyers vary from the schedule in which the uranium was delivered to the buyers.

TABLE XVI
DELIVERIES OF URANIUM TO DOE ENRICHMENT PLANTS
BY DOMESTIC CUSTOMERS

Year	Origin (Short Tons U_3O_8)			Percent Foreign	
	U.S.	Foreign	Total	Actual	Allowable
1977	14,240	703	14,943	4.7	10
1978	11,957	728	12,685	5.7	15
1979	15,436	1,591	17,027	9.3	20
1980	11,135	1,241	12,376	10.0	30
1981	10,067	1,132	11,199	10.1	40
1977-1981	62,835	5,395	68,230	7.9	22

Over the 5-year period, 7.9 percent of the uranium delivered by U.S. customers was of foreign-origin, compared with an allowable weighted average of 22 percent. Over the last 3 years, actual use of foreign uranium has been constant at about 10 percent. In 1981, 17 of the 43 domestic enrichment services customers delivering natural uranium to the DOE enrichemnt plants used some foreign uranium; 5 of these 17 customers used the fully allowable 40 percent of foreign uranium and a sixth customer used 39 percent.

2. Future Use

Table XVII lists the U.S. imports of uranium for the 1982-1990 period after deducting uranium scheduled to be resold to foreign customers of U.S. fuel fabricators. The amounts include optional deliveries and settlements of litigation. Table XVII also shows the portion of the imports which are under purchase commitments with U.S. utilities, and the portion under purchase commitments with U.S. reactor manufacturers and U.S. uranium producers.

Compared with last year's survey, the purchase commitments for U.S. utilities are about 1,900 tons U_3O_8 greater in this year's survey over the 1982-1990 period. The purchase commitments for the reactor manufacturers and uranium producers are about 9,000 tons U_3O_8 greater this year. About one-third of the total 1982-1990 commitments resulted from settlements of litigation with non-U.S. suppliers.

TABLE XVII
U.S. IMPORTS OF URANIUM
(in Short Tons U_3O_8)

Year	By U.S. Utilities	By U.S. Reactor Mfrs. & Producers	Total
1982	1,800	2,000	3,800
1983	1,200	1,100	2,300
1984	1,200	1,700	2,900
1985	1,200	2,100	3,300
1986	1,500	1,600	3,100
1987	1,500	1,000	2,500
1988	1,500	1,000	2,500
1989	1,400	1,000	2,400
1990	1,400	600	2,000

D. PROJECTED URANIUM REQUIREMENTS

The apparent future U.S. uranium requirements as reported by U.S. uranium users can be determined by adding data from Tables XI, XIV and XVII. Adding the annual U.S. delivery commitments (from Table XI) and unfilled requirements (from Table XIV) to the utilities' foreign purchase commitments (from Table XVII) results in the apparent U.S. uranium requirements as shown in Table XVIII and Figure 11.

TABLE XVIII
APPARENT U.S. URANIUM REQUIREMENTS
(in Short Tons U_3O_8)

Year	Delivery Commitments	Unfilled Requirements	Foreign Commitments	Total
1982	12,900	300	1,800	15,000
1983	12,800	1,600	1,200	15,600
1984	12,300	2,600	1,200	15,100
1985	11,700	3,100	1,200	16,000
1986	10,800	4,300	1,500	16,600
1987	10,000	5,400	1,500	16,900
1988	9,500	6,200	1,500	17,200
1989	9,300	9,100	1,400	19,800
1990	8,500	9,500	1,400	19,400

The imports of uranium by reactor manufacturers and producers from Table XVII are not included in the above totals because much of this material has resulted from settlements of litigation and, thus, does not represent actual requirements.

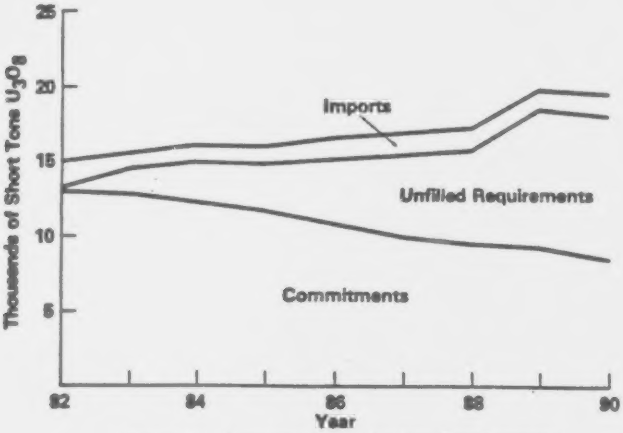


Figure 11. Apparent U.S. Uranium Requirements

E. POSSIBLE FUTURE USE OF NON-U.S. URANIUM

The possible future use of non-U.S. uranium may be determined by reference to Table XIX. The first four columns of the data are the same as presented in Table XVIII. Column 5 provides an indication of the current projected use of non-U.S. uranium and is determined by dividing the foreign commitments in Column 3 by the total requirements in Column 4. The current projected use of foreign uranium remains rather constant throughout the 1982-1990 period and averages 8 percent over the period.

However, there are some utilities that need additional uranium, as shown by the unfilled requirements in Column 2. If all the unfilled requirements were filled with non-U.S. uranium--a worst possible case--the foreign usage would increase monotonically from 14 percent in 1982 to 56 percent in 1990, and average 36 percent over the 1982-1990 period (see Column 6).

TABLE XIX
POSSIBLE FUTURE USE OF NON-U.S. URANIUM
(in Short Tons U_3O_8)

Year	Delivery Commitments (1)	Unfilled Requirements (2)	Foreign Commitments (3)	Total (4)	Current Percentage 5=(3/4)	Maximum Percentage 6=(2+3/4)
1982	12,900	300	1,800	15,000	12	14
1983	12,800	1,600	1,200	15,600	8	18
1984	12,300	2,600	1,200	15,100	7	24
1985	11,700	3,100	1,200	16,000	8	27
1986	10,800	4,300	1,500	16,600	9	35
1987	10,000	5,400	1,500	16,900	9	41
1988	9,500	6,200	1,500	17,200	9	45
1989	9,300	9,100	1,400	19,800	7	53
1990	8,500	9,500	1,400	19,400	7	56
				Average	8	36

IV. SUPPLY/DEMAND CONSIDERATIONS

A. DEMAND

In order to assess the characteristics of future U.S. uranium supply, the market which could be available to U.S. producers must be appraised, in order to distinguish between uranium demand based on the forecasted growth of nuclear reactors and the uranium demand projected by the utilities. The August 1981 "low" case developed by the DOE Office of Uranium Enrichment and Assessment (OUEA) is used in this analysis because it approximates the current OUEA "most likely" projection. Table XX presents the nuclear power growth in gigawatts electric (GWe) and the amounts of uranium required to fuel this growth in four selected years.

TABLE XX
NUCLEAR POWER GROWTH AND ANNUAL URANIUM DEMAND

Year	Nuclear Power Growth (in GWe)	Annual Uranium Requirements (in Short Tons U_3O_8)
1985	80	17,200
1990	117	23,800
1995	130	27,700
2000	148	32,200

The uranium demand in Table XX reflects natural uranium deliveries to the DOE enrichment plants, scheduled to meet specific reactor fuel requirements; this is referred to herein as the "reactor demand." However, the demand projected by U.S. utilities (herein called the "utility demand") available to domestic producers is affected by the available inventories controlled by the utilities and committed or projected purchases from non-U.S. sellers.

The sum of domestic sales commitments to U.S. buyers and the utility-reported unfilled requirements (shown in Columns 1 and 2 of Table XIX and presented in Figure 12) essentially represents the current maximum projected U.S. uranium market available to U.S. producers over the next 10 years.

This market may be reduced further if additional current U.S. inventories are used (i.e., amounts greater than shown in Figure 13), or if additional non-U.S. uranium is purchased. Currently, at least 8,000 tons U_3O_8 from foreign and domestic inventories are expected to be available for immediate sale, and non-U.S. producers are currently attempting to sell uranium to U.S. utilities for near- and long-term delivery. Some of this material is being offered at current "spot" market prices. It is probable that utilities will fill some of their currently unfilled requirements from inventories or from non-U.S. production. Furthermore, some producers are finding it more economical to buy or lease uranium from other sources than to produce it themselves.

U.S. buyers currently hold an inventory of 51,200 tons U_3O_8, much of which could be used in meeting projected reactor fuel requirements; about 5,400 tons of this inventory is of non-U.S. origin. Figure 13 shows annual uranium sales commitments to U.S. utilities from U.S. producers, unfilled uranium requirements as reported by U.S. utilities, uranium sales commitments from non-U.S. sellers to U.S. utilities, and uranium demand for reactor fuel.

The annual difference between the total sales commitments plus unfilled requirements and the demand reflects inventory adjustments. When the sum of commitments plus unfilled requirements is greater than demand (such as shown for 1982 and 1986), the following year's beginning inventory will increase; when the sum is less than demand, the inventory will shrink. Estimated use of inventories is also shown in Figure 13, starting with the 51,200 tons U_3O_8 available on January 1, 1982. On this basis, the utility inventory could be drawn down to about a one-year forward uranium reactor demand by 1992 or 1993.

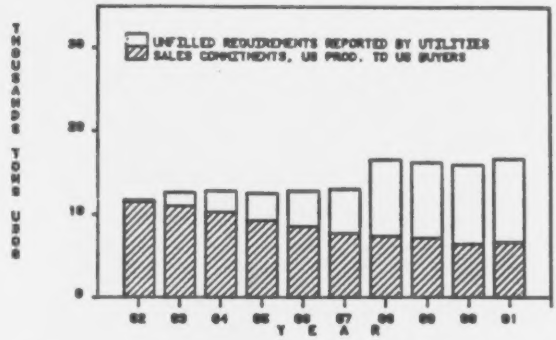
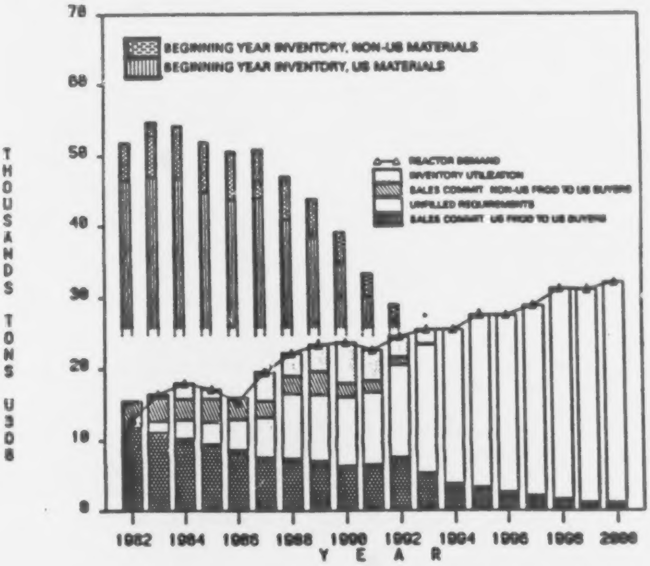


Figure 12. Current Maximum U.S. Uranium Market Requirements



*Assumes that, for remaining years, inventory in one year will be approximately equivalent to following year's uranium reactor demand.

Figure 13. Uranium Demand, Sales Commitments, Unfilled Requirements & Inventories

B. PRODUCTION CAPABILITY

The capability of the U.S. uranium producing industry to meet three projected demand cases has been assessed in order to obtain a measure of the uranium industry's ability to supply the requirements. For each case, the lowest costs at which demand could most likely be met by producers from available reserves (mean values) were estimated through the year 2000. Because of the high inventories, anticipated low prices, and the threat of foreign competition, those producers who continue to operate during about the next 10 years are expected to mine at the highest grades at which ore can be extracted, and at the same time to maintain operations to meet sales commitments. With few exceptions, mine or mill expansions to handle larger quantities of lower grade ores do not seem likely until after 1992, and then only if warranted by increased demand and sufficient prices.

Production capability was studied using the concept of production centers, which are actual or projected uranium processing plants with tributary mining operations and uranium resources. A total of 64 centers were evaluated, including conventional mills supplied by open-pit or underground mines, solution mining operations, and operations where uranium can be recovered as a byproduct of phosphate or copper mining. Many of the centers include several types of operations. Both existing and planned centers were included; the latter are assumed to have sufficient reserves to justify capital investment for needed facilities.

The three supply/demand cases evaluated are:

(1) U.S. production to meet the "firm" and "captive" sales commitments (as discussed in Section III.A.1) together with the sales commitments to non-U.S. buyers.

(2) U.S. production to meet the maximum market available to domestic producers if 40 percent of the total annual reactor demand were to be met with non-U.S. uranium; and

(3) the same situation as (2), but with 20 percent of the demand filled with non-U.S. uranium.

For each situation, the range and average production costs were estimated, together with the total average costs for 10-year and 19-year periods. Two types of costs were evaluated--"forward" production costs and "economic recovery" costs. All costs are in mid-1982 dollars. The economic recovery costs are a measure of the minimum prices which would be needed to support a 15-percent rate of return on investment after taxes. These are generalized estimates and should not be considered as projected actual prices since each company has its own particular financial objectives and constraints, and such factors may vary considerably from company to company. The economic recovery costs exclude previous acquisition or exploration costs, as well as some capital expenditures which may not yet have been amortized. These costs do not include any expenditures for replacement of reserves through additional exploration.

Uranium sales commitments, as of January 1, 1982, by U.S. uranium producers (Figure 14) total about 121,000 tons U_3O_8 through the year 2000. Of this, about 113,000 tons are committed to U.S. buyers and the remainder to non-U.S. buyers. At least 2,000 tons can be supplied from U.S. producers' inventories available on January 1, 1982. Sixty-two thousand tons can be produced by companies operating as of June 1982 to meet all or part of their own sales commitments

In Figure 14, this production is shown on an annual basis, indicated by "sales commitments backed by production". In this category, production has not been projected for producers who have shut down since January 1982, or beyond the future dates at which any producers have stated that they plan to shut down. However, some of the currently operating producers have sufficient capability to supply considerably more than their own sales commitments and could provide the remaining 58,000 tons U_3O_8 shown in Figure 14 as "sales commitments not backed by production".

Figures 15 and 16 show estimated annual ranges and averages of "forward" and "economic recovery" costs, if currently operating producers were to fill total sales commitments to U.S. and non-U.S. buyers, assuming some utilization of current domestic producer inventories. For the 10-year period 1982-1991, forward costs would be expected to range from $20-$50 per pound U_3O_8 and average about $29 per pound for about 92,000 tons U_3O_8. For the same period, economic recovery costs are estimated to range from $24-$64 per pound and average about $36 per pound. Estimated 1982 contract prices reported by U.S. buyers range from $12-$62 per pound and average $38.15 per pound. For the 19-year period 1982-2000, the annual ranges of costs and average costs would not change appreciably. Estimated costs are higher for the latter years, but do not significantly affect the total because of the lesser quantities of uranium involved.

It is evident that most of the contracts were negotiated in prior years at prices higher that the current "spot" price of around $20 per pound U_3O_8. It is also apparent that it would be more economical for many producers to buy uranium available from U.S. utility inventories or non-U.S. sources at prices of $20-$30 per pound than to produce it themselves or buy it from other domestic producers.

40-percent Non-U.S. Origin Case. Under the assumption that 40 percent of the projected uranium demand for nuclear reactor fuel would be met by uranium of non-U.S. origin, the portion of the market available to the U.S. producers would be as shown in Figure 17. The range of forward production costs to meet this market (Figure 18), including current projected sales commitments, would be $20-$55 per pound U_3O_8, with an average cost of about $30 per pound through 1991 and $34 per pound for the 1992-2000 period. Annual economic recovery costs (Figure 19) range from $24-$68 per pound, averaging about $36 per pound through 1991 and $46 per pound during the 1992-2000 period, for an average of $42 per pound for the full 19-year period.

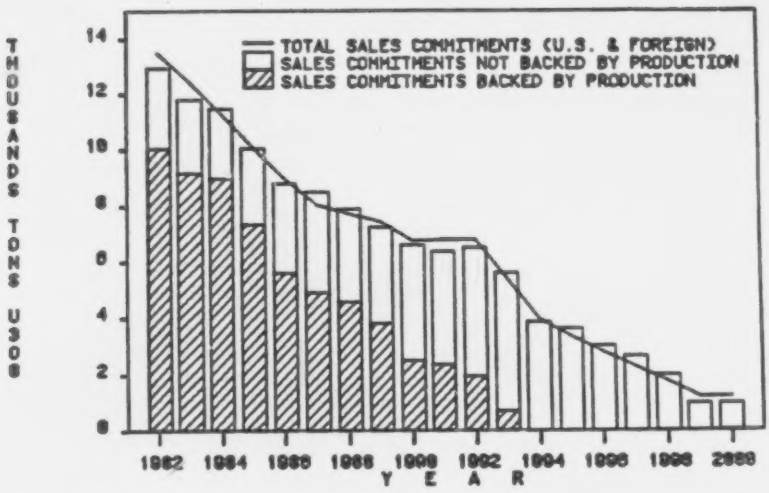


Figure 14. Uranium Sales Commitments by U.S. Producers to U.S. & Non-U.S. Buyers

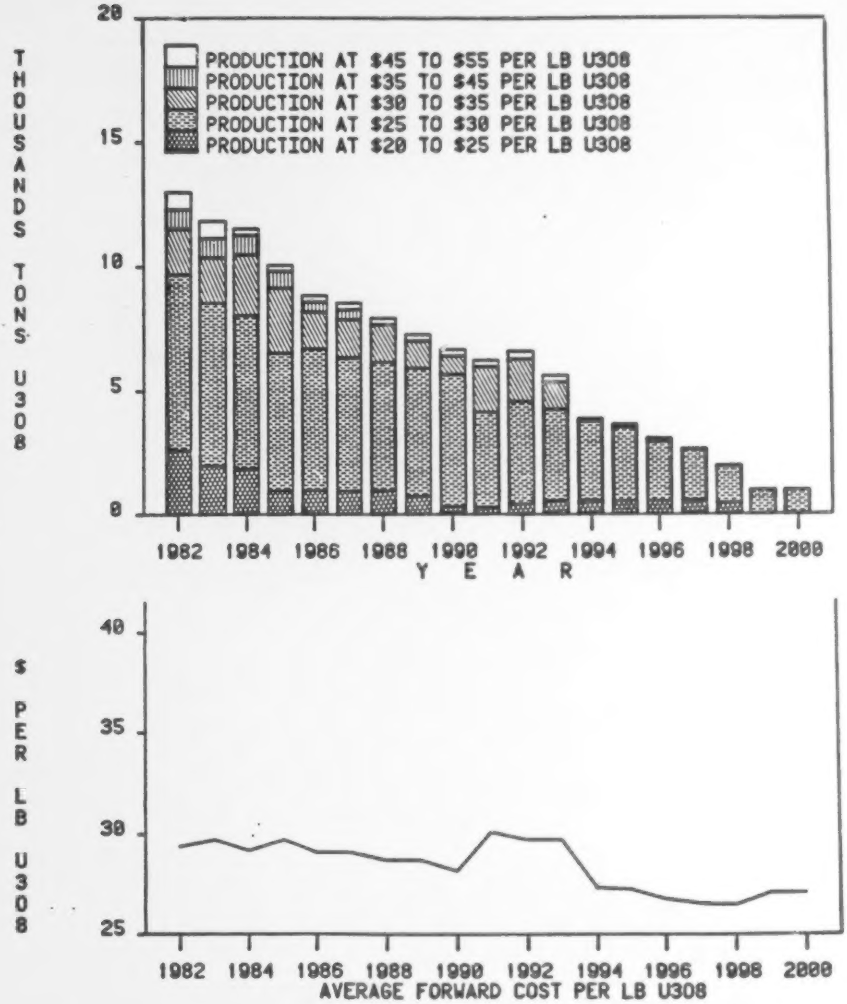


Figure 15. Forward Production Costs to Meet Sales Commitments by U.S. Producers

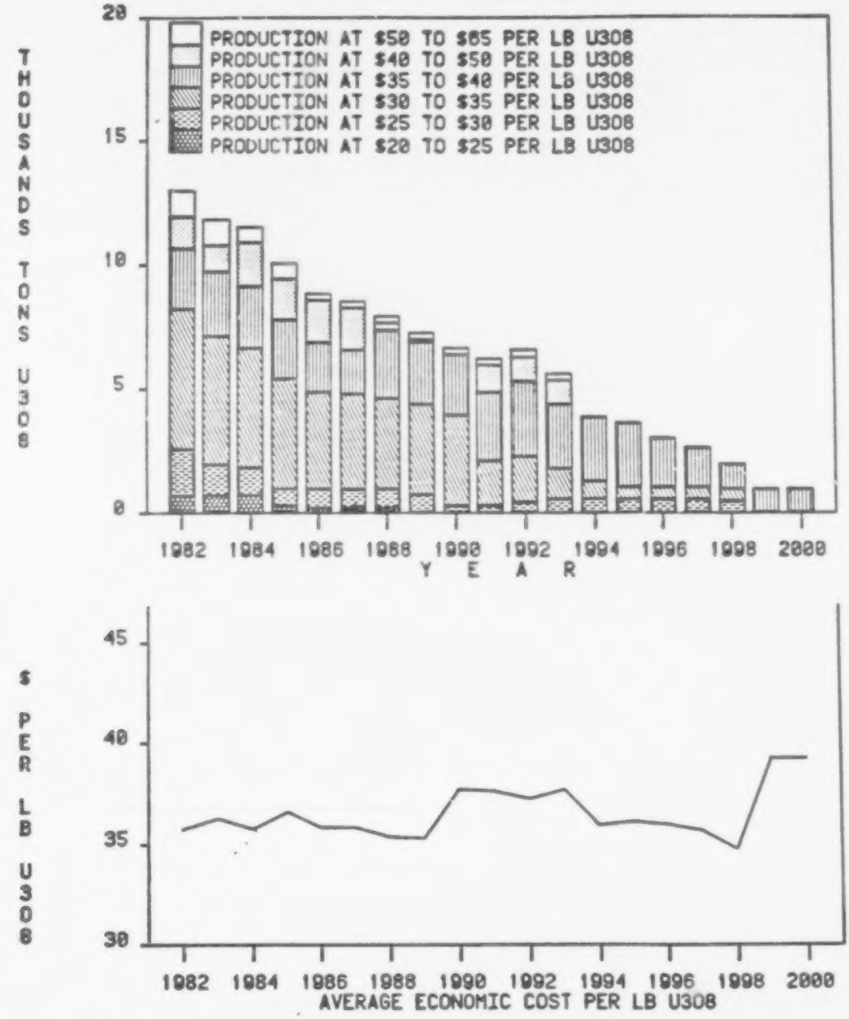


Figure 16. Economic Recovery Costs to Meet Sales Commitments by U.S. Producers

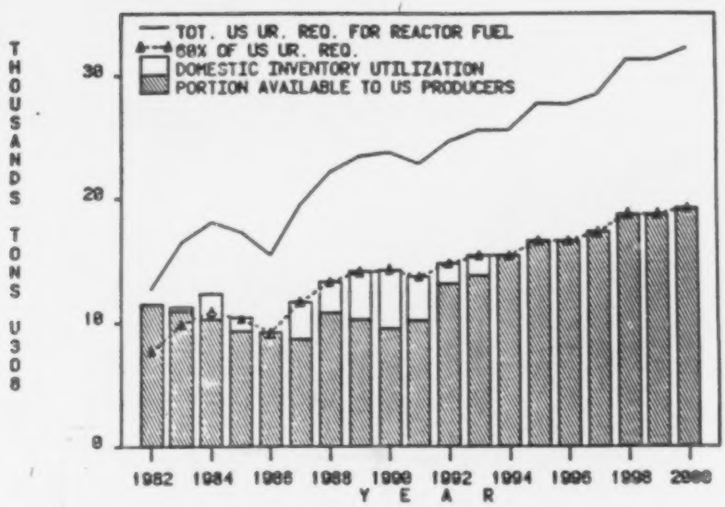


Figure 17. Effects of 40 Percent Imports on Market Available to U.S. Producers

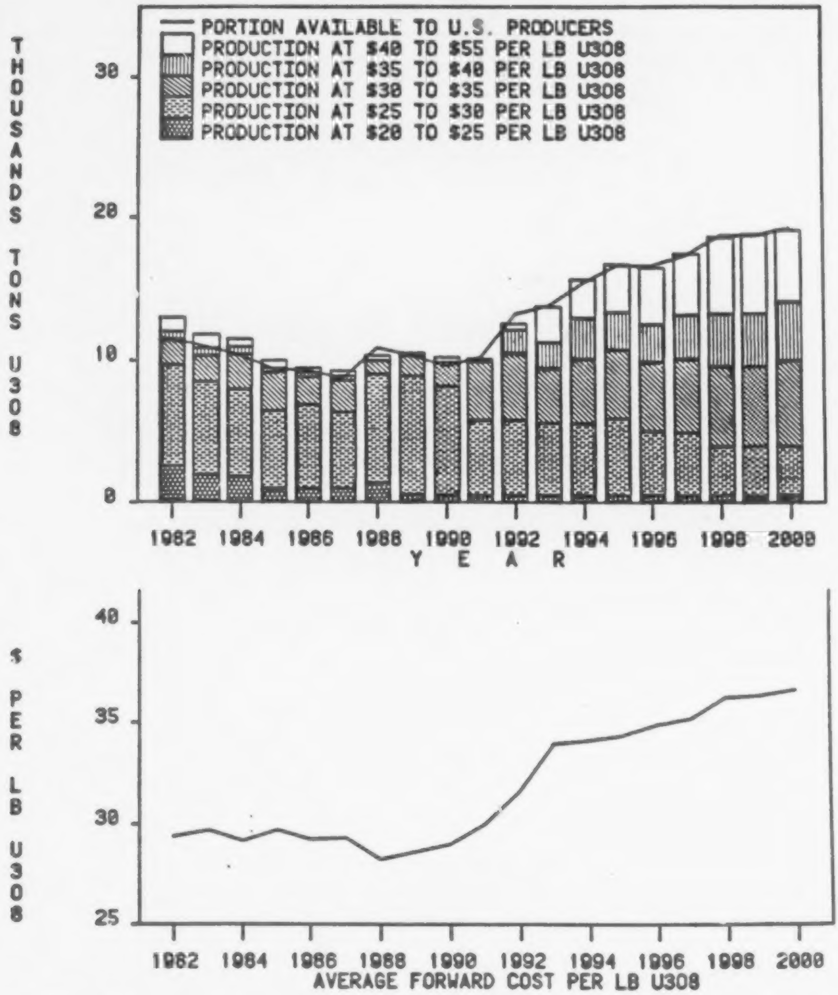


Figure 18. Forward Production Costs to Meet Uranium Demand at 40 Percent Import Level

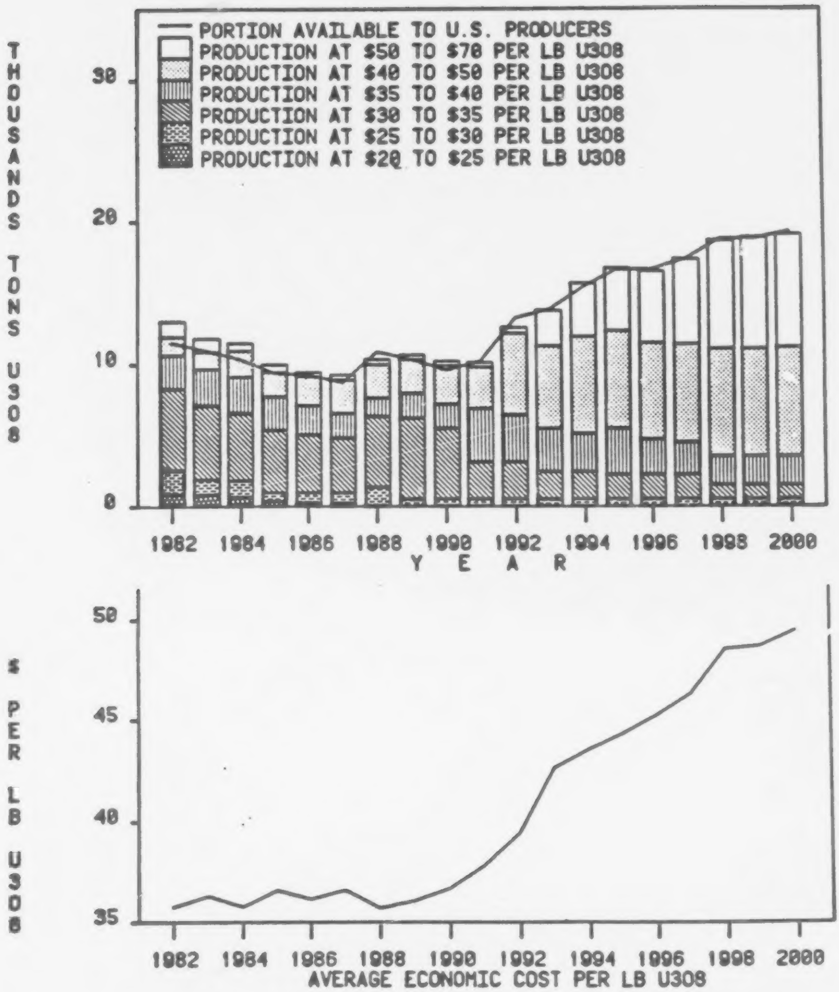


Figure 19. Economic Recovery Costs to Meet Uranium Demand at 40 Percent Import Level

20-percent Non-U.S. Origin Case. Under the assumption that 20 percent of the projected uranium demand for nuclear reactor fuel would be met by uranium of non-U.S. origin, the portion of the market available to the U.S. producers would be as shown in Figure 20. The range of forward production costs to meet this market (Figure 21), including current projected sales commitments, would be \$20-\$55 per pound U_3O_8, with an average cost of about \$30 per pound through 1991 and \$34 per pound for the 1992-2000 period. Annual economic recovery costs (Figure 22) range from \$24-\$68 per pound, averaging about \$36 per pound through 1991 and \$46 per pound during the 1992-2000 period, for an average of \$42 per pound for the full 19-year period.

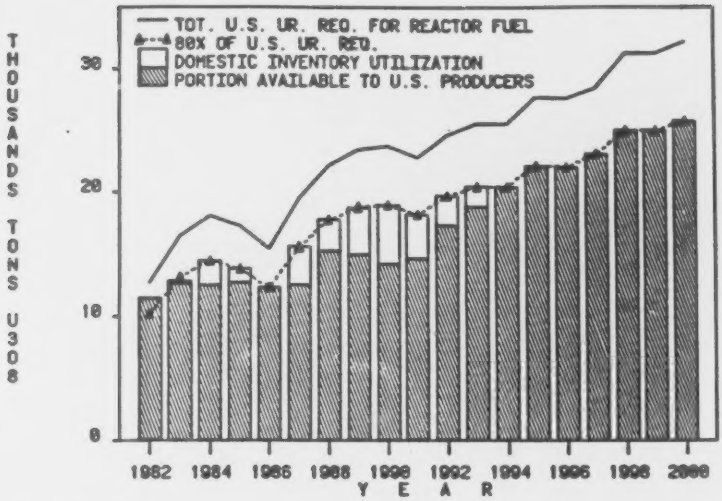


Figure 20. Effects of 20 Percent Imports on Market Available to U.S. Producers

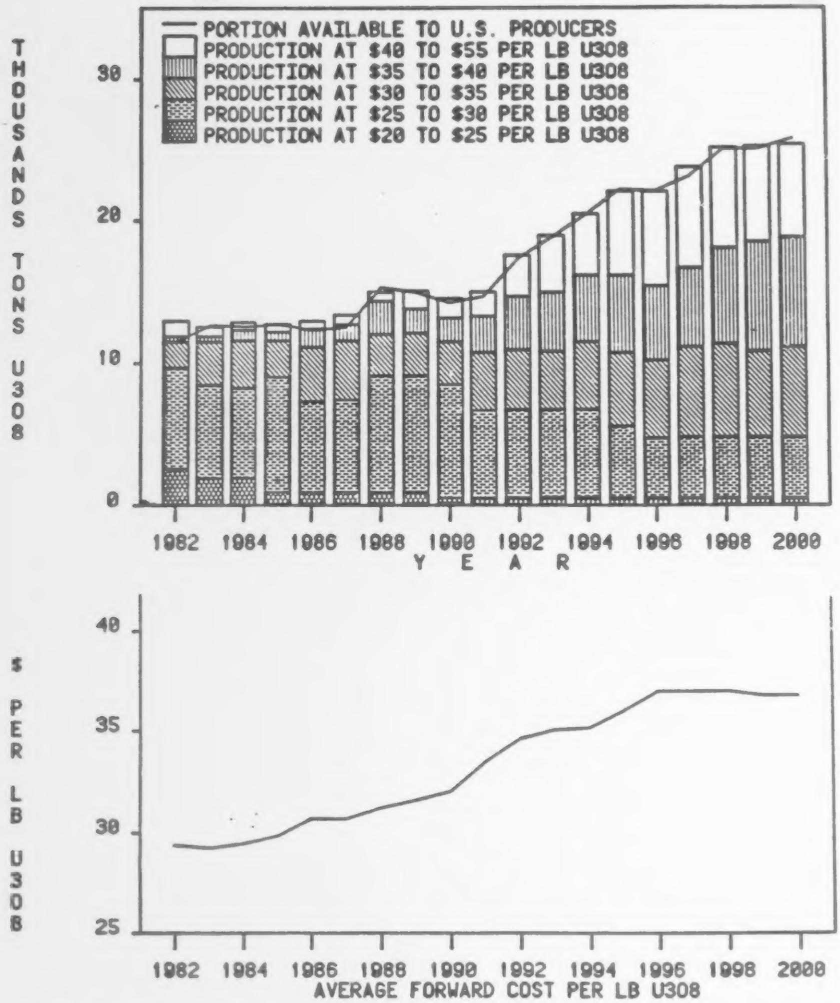


Figure 21. Forward Production Costs to Meet Uranium Demand at 20 Percent Import Level

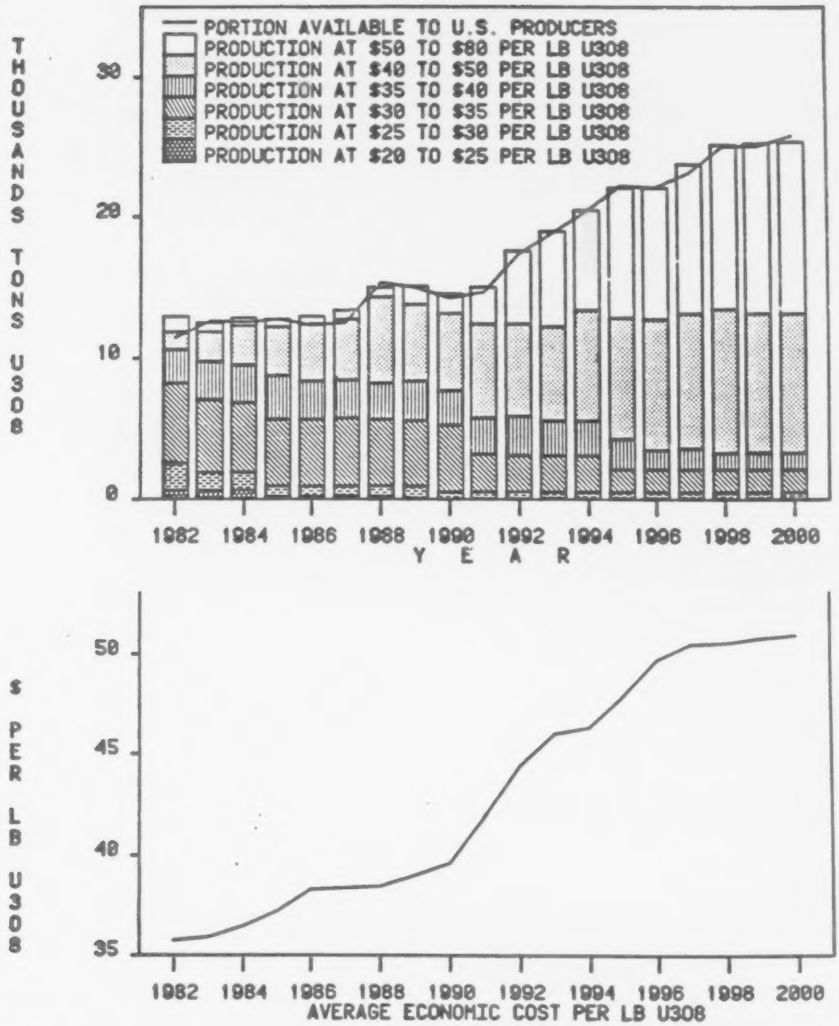


Figure 22. Economic Recovery Costs to Meet Uranium Demand at 20 Percent Import Level

C. SUMMARY OF ESTIMATED COSTS

Table XXI summarizes the estimated costs for U.S. producers to meet the three projected demand cases. As shown by the ranges of economic recovery costs, it is evident that it will not be economically feasible for the U.S. uranium industry to produce any significant quantities of uranium for sale at the current "spot" market price, assuming that no new low-cost U.S. uranium reserves are developed in the near future. On the other hand, the increase in average economic recovery cost in progressing to higher production levels over the next 10 to 19 years is relatively small. During the next 10 years, economic recovery costs of production to meet sales commitments (91,600 tons U_3O_8) could range range from $24 to $64 per pound U_3O_8 with an average of $36 per pound, while the costs to meet 80 percent of total U.S. demand (137,200 tons) could average around $38 per pound, with a range of $24 to $79 per pound. The average economic recovery cost of meeting 80 percent of the total U.S. demand through the year 2000 (337,800 tons) from U.S. uranium production could be around $45 per pound, compared to $36 per pound estimated for meeting current sales commitments for the same period (120,900 tons). This would represent an increase of about 25 percent in the average economic recovery cost to produce an additional 216,900 tons.

Since it would take from 2 to 5 years to construct facilities needed to provide production expansion after 1990, indications of increased demand and supportive prices must be apparent to producers in the mid and late 1980s in order that such expansion may be attained on a timely basis.

TABLE XXI
SUMMARY OF ESTIMATED COSTS OF U.S. PRODUCERS TO MEET THREE DEMAND CASES

Maximum Uranium Market Available to U.S. Producers*	Tons U_3O_8 Total		Forward Production Cost Dollars Per Lb. U_3O_8 (rounded)					Full Economic Recovery Cost Dollars Per Lb. U_3O_8 (rounded)				
			Range of Costs		Weighted Averages			Range of Costs		Weighted Averages		
	1982 Thru 1991	1982 Thru 2000	10-yrs.	19-yrs.	Range 19-Yrs.	10-Yrs. Avg.	19-Yr. Avg.	10-yrs.	19-yrs.	Range 19-Yrs.	10-Yrs. Avg.	19-Yrs. Avg.
If sales commitments only are met	91,600	120,900	20 to 55	20 to 55	26 to 30	29	29	24 to 64	24 to 64	35 to 39	36	36
If uranium of non-U.S. origin is used to fill 40% of U.S. reactor requirements	106,000	256,500	20 to 55	20 to 55	28 to 37	30	33	24 to 64	24 to 68	36 to 49	36	42
If uranium of non-U.S. origin is used to fill 20% of U.S. reactor requirements	137,200	335,500	20 to 55	20 to 55	29 to 37	31	34	24 to 74	24 to 79	36 to 51	38	45

*Includes current sales commitments to non-U.S. buyers. Also allows for utilization of 2000 tons U_3O_8 held in producer inventories as of 1/1/82.

QUESTIONS FROM SENATOR BINGAMAN

Question 17(b): Is it true that Canada bars export of its uranium for military purposes, including naval propulsion and strategic defense?

Answer: The U.S.-Canada Nuclear Cooperation Agreement prohibits the export of Canadian origin uranium for all military uses, including naval propulsion and strategic defense.

QUESTIONS FROM SENATOR BINGAMAN

Question 17(c): **If Canada or other major suppliers limit export for military purposes, does it follow that a viable domestic uranium industry is important to U.S. national security? If it is not, why not?**

Answer: A viable, long-term domestic uranium industry is important to U.S. national security and energy security. It is not likely, however, that DOE will need to purchase any natural uranium through at least the remainder of this century to meet defense needs. It is certainly desirable to have a viable domestic uranium mining industry, but the current problems facing this industry (e.g., low prices and large uranium surpluses) cannot be said to compromise U.S. defense needs. For energy security, the nation needs assured, economic supplies of uranium and enrichment services.

QUESTIONS FROM SENATOR BINGAMAN

Question 18:	DOE, in its "Commingled Tailings Study" issued in 1982, recognized a moral obligation for the federal government to bear a fair share of the costs of reclaiming tailings generated under old AEC contracts at so-called Commingled Tailings Sites. Does DOE continue to recognize such an obligation or has morality changed in the last several years? Does DOE support or oppose commingled tailings legislation providing for reimbursement for the federal share, and is the Department prepared to work with us in formulating such legislation?
Answer:	In June 1982, the Department issued a report entitled "Plan for Stabilization and Management of Commingled Uranium Mill Tailings." The report was prepared to meet section 213 of Public Law 96-540, which states, in part:

> "The Secretary of Energy shall develop a plan for a cooperative program to provide assistance in the stabilization and management of uranium mill tailings which have resulted from ore processing to extract uranium under contract with the United States for use primarily in defense programs and which are now commingled with other tailings."

The report summary states:

> "The plan presented here shows the effort and costs that would be incurred if the Government were to implement such a plan. The Department makes no recommendation as to the advisability of actually implementing legislation authorizing an assistance program, and stands ready to respond to comments on the plan by Congress, other Government agencies, or interested parties."

Answer 18
(continued):

The Department believes it properly responded in preparing the required plan but did not take a position on the advisability of implementing the plan. The Department has testified and continues to believe that financial responsibility for the reclamation of Title II uranium mill tailings sites should continue to be borne by the owners of the sites as currently provided by Public Law 95-604. As stated in response to a previous question, if a cooperative program is enacted by Congress, we believe the cost sharing arrangements proposed last year in S. 1004 are reasonable as they reflect the relative percentage of Title II tailings which were produced for sale to the Federal Government. We also believe that EPA should reexamine the pertinent standards and their application to these efforts. The Department is fully prepared to work cooperatively and constructively with Congress in formulating any legislation the Congress deems necessary on this subject.

U.S. URANIUM POLICY

1. What is the responsibility of DOE for U.S. uranium supply security?

2. Would U.S. uranium supply security be enhanced if the U.S. were to maintain a viable domestic uranium industry?

3. When it was decided in 1974 to phase out limitations on the enrichment of foreign uranium, the AEC committed to reinstitute these limitations or take other action if the viability of the domestic uranium industry was threatened. DOE assumed the functions and commitments of the AEC when it was created. What action has DOE taken to fulfill the AEC's commitment to maintain a viable domestic industry?

4. What is DOE's present responsibility for preserving a viable domestic uranium industry and what specific action has DOE taken to restore the viability of the industry?

5. List all authorities which could conceivably be employed either on their own or in conjunction with other authority (including section 161v. of the Atomic Energy Act) to assure the maintenance of a viable domestic uranium industry. Describe each such authority and discuss its effectiveness for purposes of assuring a domestic uranium industry. For each such authority, state whether it would be as effective in assuring the maintenance of a viable domestic uranium industry as

   (a) a $10 per pound fee levied on each pound of foreign origin uranium (or contained uranium);

   (b) a 50% domestic content requirement with grandfathering of pre-September 1986 contracts;

   (c) a 60% limit with similar grandfathering;

   (d) a 70% limit with similar grandfathering; and

   (e) an 80% limit with similar grandfathering.

   State all basic assumptions in making this comparison. Indicate the likely impact of assistance in the form of (a) through (e) above on the U.S. price of uranium.

6. Has DOE evaluated policies and programs in other countries which support or protect in any fashion those countries' domestic uranium industries or supplies? Describe any evaluation by DOE, including when and by whom it was done.

How do Japan, West Germany, France, Canada and the U.K. provide for their uranium security needs? Describe the policy of each country with respect to allowing sales of United States origin uranium and enrichment to that country's domestic electric utilities; encouraging, supporting and subsidizing exploration, mining, milling and conversion of uranium and U_3O_8; and controlling the export of uranium, including uranium in the form of UF_6, U_3O_8, or enriched uranium. Indicate the current average price for uranium paid by electric utilities in Japan, France, the U.K. and Canada.

URANIUM STOCKPILE ISSUES

7. What is a desirable inventory of uranium (in pounds of natural uranium) for the United States to hold to protect against a supply disruption?

8. Specifically, what is an adequate stockpile of uranium (in pounds of natural uranium) for defense purposes, assuming no use of depleted tails? How much uranium will be required for use in DOD programs, on average, over the next ten years?

9. Approximately half of the original government stockpile of uranium was foreign origin. What amount of the stockpile is currently foreign origin and what is the explanation for the acquisition of this uranium for the stockpile?

10. For the period 1975 through 1995, provide a detailed history and forecast of the amounts of and changes in U.S. government owned uranium stocks, with specifics as to varying enrichments and use.

11. With respect to the survey requested in question 10, indicate for each year the amount of uranium required for working inventory.

12. With respect to the survey requested in question 10, provide the following information:

    (a) Specify how much natural uranium has been used by DOE in "split tails" or overfeeding at its enrichment plants.

    (b) Is DOE currently overfeeding? If so, when and why was this program resumed?

    (c) Is DOE planning to overfeed? If so, describe proposed plans. Indicate how much natural uranium will be used in planned overfeeding.

URANIUM IMPORT QUESTIONS

13. Provide all data available on actual shipments of uranium from foreign sources to the U.S. in each year since 1975, specifically indicating shipments for domestic end use, quantities and country of origin.

14. Provide all data available with respect to commitments made during 1986 for foreign supply of uranium, including information on country of origin, quantities and future delivery years.

15. Provide all data available with respect to actual shipments of natural uranium to the U.S. from foreign sources during 1986, including quantities and country of origin.

16. Provide all data available with respect to the current inventory (January 1, 1987 or more recent) of foreign and domestic natural and enriched uranium held by U.S. utilities and suppliers.

With respect to questions 13-16, if DOE has not yet finalized its compilation of 1986 data, so indicate and provide best estimates on the basis of information available to DOE from all sources.

URANIUM NATIONALITY SWAPS

17. Describe the practice known as "nationality swaps" or "flag-swapping", whereby the nationality of uranium is changed on the books of the Federal Government. Why is this done? Which agencies are involved? Are fees paid to accomplish a swap? If so, what are the fees and to whom are they paid?

18. To what extent has DOE participated in nationality swaps since December 31, 1984 (the initial determination of domestic uranium non-viability)? Whether DOE has particiapted or not, please provide all information available to DOE on the quantities, enrichments, and country of origin of all uranium covered by nationality swaps occurring since December 31, 1984, including the approximate date of the swap.

19. Describe DOE's current policy and future plans with respect to encouraging or participating in nationality swaps. To what extent would DOE policies be affected by a court order requiring limitation on the enrichment of foreign source uranium for domestic end use?

ADDITIONAL
POST-HEARING QUESTIONS AND ANSWERS
RELATING TO THE
MARCH 9, 1987 HEARING
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES
WITNESS: A. DAVID ROSSIN
ASSISTANT SECRETARY FOR NUCLEAR ENERGY
U.S. DEPARTMENT OF ENERGY

QUESTIONS FROM SENATOR DOMENICI

U.S. Uranium Policy

Question 1:	What is the responsibility of DOE for U.S. uranium supply security?
Answer:	The Secretary of Energy reports annually on the condition of the domestic uranium mining and milling industry, as required by section 170B of the Atomic Energy Act of 1954, as amended. The factual basis for this report has been provided to the Secretary by the Energy Information Administration (EIA). One factor, of many, used by the Secretary in making his determination is the assurance of uranium supply by U.S. sources to hypothetical disruption scenarios. Based on EIA data, the United States has a resource and supply capability now to meet the upper limits of a reasonable disruption scenario.

QUESTIONS FROM SENATOR DOMENICI

U.S. Uranium Policy

Question 2: Would U.S. uranium supply security be enhanced if the U.S. were to maintain a viable domestic uranium industry?

Answer: A viable domestic uranium industry is important to U.S. energy security. However, there are large amounts of uranium in the hands of the Federal Government, domestic utilities, and various suppliers that provide a significant amount of near-term supplies and, as a result, sufficient time for domestic action if foreign supplies of uranium were interrupted. As these large inventories are worked off, the time available to activate a domestic response in the event of a supply interruption would be reduced.

QUESTIONS FROM SENATOR DOMENICI

U.S. Uranium Policy

Question 3: When it was decided in 1974 to phase out limitations on enrichment of foreign uranium, the AEC committed to reinstitute these limitations or take other action if the viability of the domestic uranium industry was threatened. DOE assumed the functions and commitments of the AEC when it was created. What action has DOE taken to fulfill the AEC's commitment to maintain a viable domestic industry?

Answer: The world has changed significantly since 1974 when the AEC announced that limitations would be phased out on the enrichment of foreign uranium for domestic end-use. In 1974, AEC had a monopoly on the commercial supply of enrichment services. Currently, commercial enrichment services are also provided by plants in France, the United Kingdom, the Netherlands, the Federal Republic of Germany, and the Soviet Union. Japan has plans to build a commercial enrichment plant. Thus, DOE lacks the market power previously held by AEC because enrichment services are available, at comparable or lower costs, from foreign sources.

Within the limits of current law, we have sought solutions for the problems of the industry. DOE has instituted a variable tails assay option which allows the enrichment customers to determine the amount of natural uranium they deliver to DOE for enrichment, which has increased the requirements for natural uranium. As you know, DOE has also sought assistance from the U.S. Trade Representative for the purpose of evaluating available options under U.S. trade laws.

QUESTIONS FROM SENATOR DOMENICI

U.S. Uranium Policy

Question 4: What is DOE's present responsibility for preserving a viable domestic uranium industry and what specific action has DOE taken to restore the viability of the industry?

Answer: DOE's authority with regard to the viability of the domestic uranium industry is contained in Section 161v of the Atomic Energy Act of 1954, as amended. However, since Section 161v is tied to placing possible limitations on the enrichment of foreign uranium for domestic end-use, such a restriction could be enforced only through the DOE enrichment contracts. The existing contracts do not contain a provision to allow us to impose such a restriction. Domestic utilities could avoid the restriction by buying their enrichment services overseas. Such a loss of enrichment sales by DOE will risk further damaging the U.S. mining industry, because domestic utilities that purchase enrichment services from foreign sources will more likely also purchase less costly foreign uranium as well.

QUESTIONS FROM SENATOR DOMENICI

U.S. Uranium Policy

Question 5: List all authorities which could conceivably be employed either on their own or in conjunction with other authority (including section 161v. of the Atomic Energy Act) to assure the maintenance of a viable domestic uranium industry. Describe each such authority and discuss its effectiveness for purposes of assuring a domestic uranium industry. For each such authority, state whether it would be as effective in assuring the maintenance of a viable domestic uranium industry as

a) a $10 per pound fee levied on each pound of foreign origin uranium (or contained uranium);

b) a 50% domestic content requirement with grandfathering of pre-September 1986 contracts;

c) a 60% limit with similar grandfathering;

d) a 70% limit with similar grandfathering; and

e) an 80% limit with similar grandfathering.

Answer: Only Section 161v of the Atomic Energy Act of 1954, as amended, has a provision that could, under the correct circumstances, restrict enrichment services in an attempt to restrict imports of uranium. However, since many foreign plants are providing commercial uranium enrichment services, DOE cannot assure the viability of the domestic uranium industry by restricting the enrichment of foreign uranium for domestic end-use. Instead of increasing the consumption of domestic uranium, restricting the enrichment of foreign uranium is likely to result in DOE losing a substantial

Answer 5 (continued):

amount of enrichment sales and further damage the U.S. uranium industry. This could make the current nonviable condition of the U.S. uranium mining industry irreversible because utilities that purchase enrichment services abroad almost certainly also will purchase foreign uranium.

Section 170B of the Act provides that DOE monitor the domestic uranium industry and determine the viability of the industry. However, Section 170B does not provide any authority to assure the maintenance of a viable industry.

Some people have suggested that DOE has a duty to request the Nuclear Regulatory Commission (NRC) to implement restrictions on the importation of uranium pursuant to Sections 53 and 69 of the Act. However, these statutory provisions relate solely to licensing for imports and, as such, impose no affirmative duty on DOE. The licensing provisions of Sections 53 and 69 were transferred to NRC at its inception. NRC has the authority to license or prohibit the licensing of importation of uranium only where such action is based upon consideration of the common defense or the health and safety of the public. NRC has no authority to regulate import licenses to assure the viability of the domestic uranium industry. Thus, even if DOE had a statutory obligation to request the NRC to implement these restrictions, there is no legal basis for NRC to act.

Answer 5 (continued):

As you know, the December 26, 1985, report of the U.S. Trade Representative evaluated a number of options under U.S. trade laws which might be relevant but concluded that "action under the U.S. trade statutes does not appear to be appropriate in regard to both the short and long-term problems facing the domestic uranium mining or milling industry."

In summary, only Section 161v of the Act relates to assuring maintenance of a viable domestic uranium industry. However, if DOE were to restrict enrichment of foreign uranium, in all likelihood the condition of industry would worsen. Thus, it is probable that any of the five remedies listed would be more effective than Section 161v restrictions.

There is no current comprehensive study that addresses the potential impacts of the specific restrictions posed in your question. A detailed analysis would be required to perform such a study.

QUESTIONS FROM SENATOR DOMENICI

U.S. Uranium Policy

Question 6: Has DOE evaluated policies and programs in other countries which support or protect in any fashion those countries' domestic uranium industries or supplies? Describe any evaluation by DOE, including when and by whom it was done.

How do Japan, West Germany, France, Canada and the U.K. provide for their uranium security needs? Describe the policy of each country with respect to allowing sales of United States origin uranium and enrichment to that country's domestic electric utilities; encouraging, supporting and subsidizing exploration, mining, milling and conversion of uranium and U308; and controlling the export of uranium, including uranium in the form of UF6, U308, or enriched uranium. Indicate the current average price for uranium paid by electric utilities in Japan, France, the U.K. and Canada.

Answer: Although some fragmentary data may exist, DOE does not have such information and, thus, has not performed the comprehensive study necessary to evaluate the policies and programs of other countries which support or protect their own uranium industries or supplies. In addition, DOE does not have information on how Japan, West Germany, France, Canada, or the U.K. provide for their uranium security needs, nor do we possess information on the average price for uranium paid by electric utilities in these countries.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 7: What is a desirable inventory of uranium (in pounds of natural uranium) for the United States to hold to protect against a supply disruption?

Answer: The Department has no specific plans to maintain inventories of natural uranium solely to protect customers against uranium supply disruptions. Rather, it is the responsibility of utility management to set a policy to assure that adequate uranium supplies are on hand to meet extraordinary contingencies, as defined by that utility.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 8: Specifically, what is an adequate stockpile of uranium (in pounds of natural uranium) for defense purposes, assuming no use of depleted tails? How much uranium will be required for use in DOD programs, on average, over the next ten years?

Answer: The Uranium Enrichment program plans to maintain sufficient stockpiles of enriched uranium to meet normal working inventory needs and to assure that customer requirements can be met on a timely basis. Current DOE policy is that 120 days of the following year's demand will be set aside for this purpose for low enriched uranium. For high assay enriched uranium, the Department is currently evaluating what a comparable inventory should be. It presently appears that about 100 days of inventory will be adequate for this purpose. The enrichment program has no plans to set aside a contingency inventory at its enrichment plants to cover extraordinary events.

Average annual uranium needs over the next 10-year period for national security programs will be on the order of 4,000,000 to 10,000,000 pounds of uranium for the range of government demands currently identified. Thus, this would translate into an inventory which contains on the order of 100,000 to 300,000 pounds of uranium.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 9: Approximately half of the original government stockpile of uranium was foreign origin. What amount of the stockpile is currently foreign origin and what is the explanation for the acquisition of this uranium for the stockpile?

Answer: From 1943 to 1971, the Atomic Energy Commission (and before it, the Manhattan Engineering District) purchased 652 million pounds of U308 of which 300 million pounds was purchased from foreign sources during the years 1943 to 1967 and 352 million pounds was purchased from U.S. sources during the years 1944 to 1971. The Atomic Energy Commission (and its successor agencies, the Energy Research and Development Administration and the Department of Energy) did not purchase any uranium after 1971. The uranium was purchased for two purposes: (1) to provide for future U.S. Government enriched uranium requirements and (2) to help stimulate the U.S. uranium mining and milling industry.

Over the years, uranium has not been physically tracked in the Department's material management system. However, we consider that any foreign-origin material has already been used in support of U.S. Government programs because of our practice of using the oldest feed material first. Although much of the U.S.-origin uranium was also used to meet U.S. Government requirements, we believe that the material that remains in the DOE stockpile is U.S.-origin uranium.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 10:	For the period 1975 through 1995, provide a detailed history and forecast of the amounts of and changes in U.S. government owned uranium stocks, with specifics as to varying enrichments and use.
Answer:	The requested data are summarized in the attached table.

Answer 10
(continued):

Uranium Inventories at DOE Enrichment Plants
(Metric Tons of Uranium)

Fiscal Year	Work in Process 1/	Low Assay 2/	High Assay 3/	Natural Uranium 4/
1975	2,642	5,627	3	21,600
1976	2,214	6,647	4	20,700
1977	3,949	7,804	4	22,200
1978	9,199	7,987	6	21,500
1979	9,649	7,934	23	26,100
1980	11,442	8,041	23	28,800
1981	11,392	7,613	15	31,700
1982	13,916	6,291	15	36,000
1983	14,132	4,886	19	40,100
1984	5,957	4,357	19	42,900
1985	5,196	3,957	20	46,900
1986	5,148	3,064	16	54,400
1987	4,976	2,789	12	63,300
1988	4,804	910	7	71,100
1989	4,804	1,030	7	59,300
1990	4,804	1,010	7	51,700
1991	4,804	1,320	7	43,600
1992	4,804	1,440	7	29,600
1993	4,804	1,370	7	20,700
1994	4,804	1,120	7	15,400
1995	4,804	1,270	7	9,800

1/ Covers a large span of U-235 assays; average assays are on the order of 1 percent.

2/ Average U-235 assays are on the order of 3 percent; low assay material is used primarily for power reactors.

3/ Assays greater than 92 percent through FY 1978; 5 percent and greater, thereafter. High assay material is used primarily to meet national security needs.

4/ Consists of all natural uranium on hand including uranium pre-delivered by customers under usage agreements and inventories held under Feed Holding Agreements.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 11: With respect to the survey requested in question 10, indicate for each year the amount of uranium required for working inventory.

Answer: From 1975, DOE has had large stockpiles of enriched and natural uranium that are well in excess of working inventory needs. As noted earlier, we currently believe that enriched inventories equivalent to 120 days of low assay uranium and 100 days of highly enriched uranium will be adequate to assure that deliveries can be made on an as-required basis.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 12(a): With respect to the survey requested in question 10, please specify how much natural uranium has been used by DOE in "split tails" or overfeeding at its enrichment plants.

Answer: We have done some preliminary calculations which indicate that a total of about 49 million pounds of U308 equivalent was used to overfeed the enrichment plants since FY 1975. In addition, almost 10 million pounds of U308 equivalent was regenerated by recycling 0.30 U-235 tails in the mid-to-late-1970's. Thus, a net total of about 39 (i.e., 49 less 10) million pounds of U308 from the DOE stockpile was used for overfeeding over that time period.

On October 3, 1984, and September 26, 1985, the Secretary announced that the Department would not overfeed the enrichment plants in fiscal years 1985 and 1986 respectively. While there is no effect on the uranium industry whether the Department overfeeds or not, there is a perception by some in the industry that overfeeding may depress sales for them. By not overfeeding, the Department avoided even the perception of causing harm to the industry.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 12(b): Is DOE currently overfeeding? If so, when and why was this program resumed?

Answer: Yes. Overfeeding was resumed at the beginning of FY 1987 because higher tails assay operation resulted in the most efficient production mode.

QUESTIONS FROM SENATOR DOMENICI

Uranium Stockpile Issues

Question 12(c): Is DOE planning to overfeed? If so, describe proposed plans. Indicate how much natural uranium will be used in planned overfeeding.

Answer: We are planning to overfeed (i.e., operating at a higher tails assay than the average transaction tails assay chosen by our customers). Our current long-range operating plan anticipates overfeeding over much of the next 10 years. The operating and transaction tails assays currently forecast for the next 10 years is shown below.

	Tails Assays - %U-235	
FY	Operating	Transaction
1988	0.32	0.26
1989	0.35	0.29
1990	0.29	0.29
1991	0.29	0.29
1992	0.36	0.27
1993	0.31	0.26
1994	0.28	0.25
1995	0.28	0.25
1996	0.27	0.25
1997	0.24	0.24

A net total of approximately 35 million pounds of U3O8 equivalent will be used in overfeeding through FY 1997 in this plan.

QUESTIONS FROM SENATOR DOMENICI

Q-13: Provide all data available on actual shipments of uranium from foreign sources to the U.S. in each year since 1975, specifically indicating shipments for domestic end use, quantities and country of orign.

A: The following table displays uranium imports intended for domestic end use from 1975 through 1985. The foreign sources of the uranium are shown for years 1982 through 1986 only; these data were not collected prior to 1982.

Quantity (Millions of Pounds of U_3O_8)

Year	Canada	South Africa	Other	Total
1975	N/A	N/A	N/A	1.4
1976	N/A	N/A	N/A	3.6
1977	N/A	N/A	N/A	5.6
1978	N/A	N/A	N/A	5.2
1979	N/A	N/A	N/A	3.0
1980	N/A	N/A	N/A	3.6
1981	N/A	N/A	N/A	6.6
1982	14.2	2.4	0.5	17.1
1983	5.4	2.0	0.8	8.2
1984	6.6	3.3	2.6	12.5
1985	6.8	4.9	0.0	11.7
Preliminary				
1986	6.7	6.4	0.7	13.8

N/A - Shipments by exporting countries not available.

QUESTIONS FROM SENATOR DOMENICI

Q-14: Provide all data available with respect to commitments made during 1986 for foreign supply of uranium, including information on country of origin, quantities and future delivery years.

A: Preliminary data show that 14 new import contracts were initiated in 1986. These contracts are for the delivery of 20.5 million pounds of U_3O_8 for the years 1986 through 1999. Of the 20.5 million pounds, 10.6 will come from Australia, and 9.9 from Canada.

It should be noted that the response to this question is based on preliminary data and has a high probability of changing when the data collection is completed.

QUESTIONS FROM SENATOR DOMENICI

Q-15: Provide all data available with respect to actual shipments of natural uranium to the U.S. from foreign sources during 1986, including quantities and country of origin.

A: Preliminary data show that 13.8 million pounds U_3O_8 intended for domestic end use were imported in 1986, of which 6.7 came from Canada, 6.4 from South Africa, and 0.7 from Australia.

It should be noted that the response to this question is based on preliminary data and has a high probability of changing when the data collection is completed.

QUESTIONS FROM SENATOR DOMENICI

Q-16: Provide all data available with respect to the current inventory (January 1, 1987 or more recent) of foreign and domestic natural and enriched uranium held by U.S. utilities and suppliers.

A: Preliminary data show the current inventory of uranium (as of 12-31-86) as follows:

Domestic Natural	83.6 million pounds U_3O_8 equivalent
Foreign Natural	21.2 million pounds U_3O_8 equivalent
Domestic Enriched	45.8 million pounds U_3O_8 equivalent
Foreign Enriched	17.8 million pounds U_3O_8 equivalent

It should be noted that the response to this question is based on preliminary data, and has a high probability of changing when the data collection is completed.

QUESTIONS FROM SENATOR DOMENICI

Uranium Nationality Swaps

Question 17: Describe the practice known as "nationality swaps" or "flag-swapping", whereby the nationality of uranium is changed on the books of the Federal Government. Why is this done? Which agencies are involved? Are fees paid to accomplish a swap? If so, what are the fees and to whom are they paid?

Answer: "Nationality swaps" are transactions in which the ownership of a given quantity of nuclear material is exchanged with an equivalent quantity of the same type of nuclear material. This exchange or transfer may involve material in the same or different place, of the same or different assay, or in the same or different chemical form. The combinations possible are numerous, however, in all cases the origin "label" associated with each quantity of material is exchanged. The primary purpose for "nationality swaps" has historically been to avoid unnecessary transportation charges. In a limited number of cases, "nationality swaps" have been executed in order to obtain a preferred origin for nuclear material for real or perceived compliance with legal requirements, for purposes of obtaining material which is more politically acceptable and in cases where expedient delivery is needed.

Current DOE policy would normally permit it to be a party to "nationality swaps" only when all or a portion of the material is located at or titled to DOE, and where the material to be swapped is fungible in nature. The Nuclear Regulatory Commission and the State Department are also involved in the approval of nationality swaps; however, only the safety and nonproliferation aspects are reviewed. DOE is not specifically aware of fees paid to accomplish swaps.

QUESTIONS FROM SENATOR DOMENICI

Uranium Nationality Swaps

Question 18:	To what extent has DOE participated in nationality swaps since December 31, 1984 (the initial determination of domestic uranium non-viability)? Whether DOE has participated or not, please provide all information available to DOE on the quantities, enrichments, and country of origin of all uranium covered by nationality swaps occurring since December 31, 1984, including the approximate date of the swap.
Answer:	The Department has approved "nationality swaps" only on the following basis:

1. DOE approval is limited to UF6 present at a DOE facility or between DOE and the feed converter. Once the product is delivered to the enrichment facility, no "nationality swap" would be permitted except in the case of the material being of the same assay and at the same place.
2. In all cases, the "nationality swap" must take place at the same time.
3. The uranium must be of the same assay.
4. The uranium must be of the same chemical form.

The attached table reflects all known occurrences of "nationality swaps" that have taken place since December 31, 1984.

COUNTRY OF ORIGIN SWAPS
(December 31, 1984 through March 13, 1987)

Action Date	Quantities kg	Country of Origin From	Country of Origin To
01/15/85	191,473	United States	Canadian
01/04/85	7,402	Canadian	United States
01/04/85	4,177	Canadian	Portugal
01/04/85	124,384	United States	South African
01/04/85	204	United States	French
01/04/85	176,256	United States	South African
01/29/85	391,030	Canadian	United States
02/15/85	114,818	United States	Canadian
03/04/85	238,447	United States	Canadian
03/08/85	128,304	United States	South African
03/15/85	9,100	United States	Canadian
03/26/85	226,273	United States	Canadian
03/26/85	46,328	United States	South African
03/26/85	8,713	United States	W. Germany
04/14/85	22,731	United States	French
04/15/85	60,300	United States	Canadian
04/30/85	84,979	United States	Canadian
04/26/85	72,455	United States	Canadian
04/26/85	70,516	United States	French
04/26/85	6,091	United States	Portugal
04/26/85	14,022	United States	Canadian
05/15/85	141,163	United States	Australian
05/20/85	179,010	United States	Australian
05/03/85	8,595	United States	Canadian
05/03/85	57,408	United States	Australian
05/03/85	56,058	United States	South African
05/03/85	391,030	United States	Canadian
05/17/85	148,172	United States	South African
05/17/85	16,290	United States	Canadian
05/31/85	41,000	United States	Canadian
05/31/85	43	South African	United States
05/31/85	43	United States	South African
05/31/85	80	United States	Canadian
07/03/85	92,180	United States	South African
07/03/85	53,146	United States	Canadian
07/15/85	57,295	United States	South African
07/31/85	740	United States	French
08/15/85	9,054	United States	Canadian
08/15/85	52,961	United States	South African
09/04/85	39,905	United States	Canadian
09/04/85	62,953	United States	South African
09/13/85	448,225	United States	South African
09/13/85	345	United States	Canadian
09/16/85	3,062	United States	Canadian

Action Date	Quantities kg	Country of Origin	
		From	To
10/04/85	93,767	United States	Canadian
10/15/85	106,381	United States	Canadian
11/01/85	39,553	United States	South African
11/07/85	24,585	United States	Canadian
11/29/85	9,075	United States	South African
12/02/85	162,415	United States	Canadian
12/02/85	417	United States	South African
12/04/85	90,718	United States	South African
12/04/85	23,101	United States	Canadian
12/16/85	95,682	United States	Canadian
12/16/85	47,841	United States	South African
12/31/85	16,213	United States	Canadian
12/31/85	100,000	United States	South African
12/31/85	92,660	United States	Australian
12/31/85	61,534	United States	Canadian
01/03/86	104,474	United States	Canadian
01/15/86	139,460	United States	Canadian
01/24/86	250,470	United States	South African
02/04/86	105,598	United States	Canadian
02/04/86	280,761	United States	South African
02/28/86	22,158	Australian	Canadian
02/28/86	92,660	Austrialian	Canadian
03/17/86	80,397	South African	United States
03/17/86	80,397	United States	South African
03/06/86	2,090	United States	Canadian
03/06/86	59,172	United States	Australian
04/01/86	119,612	United States	Australian
03/13/86	71,591	United States	Canadian
04/15/86	44,585	United States	Canadian
04/24/86	51,805	United States	Canadian
04/24/86	62,301	United States	Canadian
05/02/86	104,878	United States	Australian
05/02/86	232,614	United States	Canadian
05/02/86	138,020	United States	South African
06/02/86	257,449	United States	South African
06/02/86	19,965	United States	Australian
06/02/86	238,603	United States	Canadian
06/02/86	4,369	United States	W. Germany
05/05/86	5,743	United States	South African
05/05/86	19,136	United States	Canadian
05/15/86	91,000	United States	South African
06/15/86	118,943	United States	South African
06/19/86	249,946	United States	Canadian
06/18/86	5,669	United States	South African
06/06/86	14,022	Canadian	South African
07/03/86	182,131	United States	South African
07/03/86	30,240	South African	United States
07/01/86	95,680	United States	South African

Action Date	Quantities kg	Country of Origin	
		From	To
07/01/86	75,446	United States	Canadian
07/07/86	103,696	Canadian/U.S.	U.S./French
08/05/86	88,079	United States	South African
08/05/86	88,079	United States	South African
08/05/86	88,079	South African	United States
08/04/86	46,199	French	South African
08/22/86	11,099	South African	United States
08/26/86	26,698	United States	Australian
08/26/86	11,482	United States	Canadian
09/02/86	53,582	United States	French
09/02/86	273,918	United States	Canadian
09/18/86	111,745	United States	South African
11/04/86	80,124	United States	Canadian
10/01/86	344,673	United States	South African
10/01/86	7,460	United States	Canadian
10/31/86	88,804	United States	Canadian
10/31/86	47,840	United States	South African
11/13/86	11,951	United States	Portugal
12/01/86	389,784	United States	Canadian
12/01/86	57,379	United States	South African
11/26/86	91,619	United States	West African
12/03/86	52,317	United States	Canadian
12/08/86	76,126	United States	Canadian
12/15/86	24,052	United States	Canadian
12/10/86	79,885	United States	Australian
12/10/86	54,675	United States	Canadian
12/22/86	2,966	South African	United States
12/22/86	1,004	South African	Portugal
12/12/86	4,211	United States	Canadian
12/12/86	1,701	United States	French
12/12/86	35,543	United States	South African
01/06/87	222,800	United States	Canadian
01/16/87	23,740	United States	Canadian
01/21/87	5,874	United States	Australian
02/02/87	35,077	United States	Canadian
02/02/87	47,840	United States	South African
02/02/87	4,156	South African	United States
02/23/87	44,418	Canadian	United States
02/19/87	49,754	United States	Canadian
02/28/87	47,854	United States	Canadian
02/28/87	294,762	United States	Canadian
02/28/87	124,594	United States	South African
02/28/87	236,584	United States	West African
02/28/87	7,934	United States	French
03/02/87	168,812	United States	South African
03/13/87	11,746	United States	South African

QUESTIONS FROM SENATOR DOMENICI

Uranium Nationality Swaps

Question 19: Describe DOE's current policy and future plans with respect to encouraging or participating in nationality swaps. To what extent would DOE policies be affected by a court order requiring limitation on the enrichment of foreign source uranium for domestic end use?

Answer: DOE does not encourage the activity known as "nationality swapping" and participates only to the extent of regulating swaps that occur within the Department's jurisdiction; i.e., when the material is physically located at DOE's facilities or titled to DOE. The Department's current policy is to approve nationality swaps of nuclear material only if the uranium is (1) at the same place, (2) at the same time, (3) of the same chemical form, and (4) of the same assay. DOE will continue to execute its policies in this matter consistent with all U.S. laws, including whatever action is taken by the court regarding the enrichment of foreign-origin uranium for domestic end use.

AMERICAN NUCLEAR ENERGY COUNCIL
410 FIRST STREET, SE
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EDWARD M. DAVIS
PRESIDENT

April 6, 1987

The Honorable Wendell H. Ford
Chairman
Subcommittee on Energy Research & Development
Energy & Natural Resources Committee
173A SROB
Washington, D.C. 20510

Dear Chairman Ford:

I want to thank you and your Subcommittee for the opportunity to testify on the current status of the domestic uranium mining industry.

Please find enclosed the responses to the Subcommittee's questions that were transmitted by your letter dated March 16, 1987.

If there are any further questions concerning my testimony or responses, please have the Subcommittee staff contact the Council.

Once again, thank you for the opportunity to testify.

Sincerely,

E Davis

Edward M. Davis

Enclosures

KB:rh

cc: Senator Pete Domenici
Ranking Republican

HEARING ON URANIUM MINING AND MILL TAILINGS RECLAMATION
MARCH 9, 1987
FOLLOWUP QUESTIONS AND ANSWERS
QUESTIONS FOR ED DAVIS
FROM SENATOR WENDELL FORD

1. Question: The electric utility industry supported S. 1004, the bill reported last year by the Committee, as I understand it, because you want to see the uranium enrichment enterprise put back into a businesslike situation. You had to accept a bill with import restrictions and mill tailings cleanup costs in it as a price of getting the legislation to move.

-How should the costs of cleanup of uranium mill tailings be apportioned?

Answer: It is clear that both U.S. uranium mining and enrichment activities are experiencing severe difficulties that threaten the very viability of these essential elements of the U.S. commercial nuclear energy program.

As discussed in my testimony to the Committee, the industry believes that, because of the interdependency of these two nuclear fuel cycle steps, a comprehensive legislative solution to both uranium mining and enrichment problems is warranted and desirable.

Notwithstanding, various segments of the U.S. commercial nuclear energy industry, as well as individual companies, have certain reservations with respect to the import restrictions and mill tailings cleanup provisions of S. 1004, as reported by the Energy Committee last year. However, the industry is prepared to support comprehensive legislation because such legislation would be beneficial to the industry as a whole and would help serve to maintain nuclear energy as a viable energy option for the future.

Accordingly, the American Nuclear Energy Council (ANEC) believes that a comprehensive, equitably-balanced legislative package, such as S. 1004, addressing the major issues of the nuclear fuel cycle, including uranium mining viability, mill tailings cleanup, and enrichment viability would be supportable by the domestic uranium mining industry and the electric utilities.

Question: How do you respond to a bill that would contain import restrictions or a requirement for paying for uranium mill tailings cleanup?

Answer: As indicated in the previous answer, ANEC believes that a comprehensive equitably-balanced legislative package, such as S. 1004, addressing the major issues of the nuclear fuel cycle could be supported by all parties.

2. Question: Do you believe that the maintenance of a viable domestic uranium mining and milling industry is in the national interest?

Answer: It is in the long-term interest of both electricity customers and the citizens of the United States, to have the reliability and diversity of an uranium fuel supply including on-shore, domestic uranium production capability. The U.S. Energy Information Agency (EIA), in its report on uranium viability, stated that only three uranium mines were operational in 1985. Perhaps even fewer mines remain in operation today.

Clearly, steps must be taken to maintain an on-shore, domestic uranium production capability as a hedge against possible foreign embargoes, cartels and other unfair foreign trade practices.

3. Question: Shouldn't ratepayers who benefited from nuclear power share in the cost of reclaiming mill tailings sites?

Answer: Electric utilities have paid for initial mill tailings stabilization under prior uranium supply contacts. Subsequent changes in the stabilization criteria, however, presently require additional treatment of the mill tailings. The electric utilities believe that the states, the federal government and the uranium producers should pay the lion's share of the cost of that stabilization. Should Congress desire to provide additional financial assistance for mill tailings reclamation and stabilization, as part of a comprehensive legislative package, then the electric utility industry will work with Congress to formulate reasonable legislation that will not adversely affect the electric utility customer and the competitiveness of U.S. industry.

4. Question: What are your estimates of the costs of reclaiming the so-called active mill tailings sites covered by last year's version of S. 1004?

Answer: ANEC has no first-hand, independent estimates of the costs of mill tailings cleanup. However, recent estimates made by the uranium mining industry appear to be reasonable. In addition, ANEC believes that these estimates made by the uranium mining industry could be maintained only if the private sector remains responsible for the cleanup operation rather than a government-operated program.

5. Question: Do either of you believe that the recently-

released National Academy of Sciences study on uranium mill tailings justifies a new look at EPA regulations for mill tailings reclamation?

Answer: The National Academy of Sciences study, entitled "Scientific Basis For Both Assessment and Management of Uranium Mill Tailings", strongly suggests that the standards for mill tailings reclamation are too high. Overly stringent standards would certainly cause any mill tailings reclamation program to be more costly and expensive than would otherwise be the case if such reclamation was based on more reasonable standards. Therefore, it would be reasonable for Congress to request that the EPA review its regulations in light of the Academy study to determine whether such regulations are overly stringent.

6. Question: Do you believe that justifiable changes in the regulations could reduce the cost of the cleanup? How much?

Answer: Changes to the EPA regulations could significantly reduce the cost of mill tailings cleanup. The estimates for cleanup presently range from $1 to over $10 a ton. There are even some estimates which place the cleanup costs at even less than $1 a ton. However, it is too early to accurately estimate the costs for mill tailing cleanup under any future revisions of EPA regulations. Thus, the amount of savings incurred by these reduced regulations is not known at this time.

QUESTIONS FOR MR. DAVIS

FROM: SENATOR JEFF BINGAMAN

1) Question: Does ANEC agree with the view that once the domestic uranium industry has shrunk so much that only profitable companies remain in it, even if it is so small as only to serve a fraction of U.S. demand, that the domestic industry is then "viable" and DOE is off the hook on section 161v. of the Atomic Energy Act, which requires the agency to assure the maintenance of a viable domestic uranium industry?

Answer: As stated in my testimony, a continued supply of reliable and economic electricity, along with attendant fuels, is required to promote the nation's growth and competitiveness in an expanding global economy. To accomplish this, electric utilities support the basic principle of free and fair international trade for all commodities, including fuels.

Moreover, utilities would like to purchase domestic uranium as long as it is priced competitively. In fact, it is in the long-range interest of electricity customers to have the security of an availible domestic supply in the event it is needed.

Therefore, any legislative proposal concerning trade restrictions, that is intended to maintain a domestic uranium mining industry, must balance the need for economic supplies at competitive prices with the continued need for diversified and reliable sources of supply. As reported by the Senate Energy Committee last year, S. 1004, the "Uranium Revitalization and Tailings Reclamation Act of 1986", represented a well-balanced legislative package which was supported by both the nuclear utility industry and the domestic uranium producers.

2) Question: Could you describe for us ANEC's understanding of any subsidies or protections which our trading partners supply to their own uranium industries? I am particularly interested in Canada, France, and South Africa. I am also interested in any evidence of market exclusion, dumping, or unfair trade practices. If you do not have the information today, would you please survey your members and supply an answer within two weeks?

Answer: ANEC has not specifically investigated any of the allegations of possible subsidies or protections in dealing in the international uranium market. However, a reliable competitive domestic uranium mining industry is in the best interest of both the electricity customers and the U.S. citizens.

Because of the recent slow down in demand for uranium and because foreign sources have captured a greater portion of the U.S. uranium market, attention should be given to maintaining a reliable domestic uranium production capability. However, only a comprehensive, equitably-balanced legislative package, such as S. 1004, will resolve the industry's nuclear fuel problems in a fair and equitable manner.

3) Question: Does ANEC agree that a viable domestic uranium industry is important to U.S. national security and energy independence?

Answer: ANEC supports the need for a reliable and competitive domestic uranium production capability to support U.S. national security and maintain energy independence.

a) Question: Can ANEC live with a level of domestic use of domestic source uranium sufficient to assure the maintenance of a viable domestic uranium industry?

Answer: ANEC supports a balanced legislative package, such as S. 1004, in order to maintain a reasonable domestic uranium industry.

b) Question: If DOE or Congress were to require domestic source uranium to be used, would U.S. utilities be able to pass along any increased costs?

Answer: The answer to this question is not always clear. Many utilities are allowed to pass along to ratepayers reasonable fuel costs. However, there are some state rate commissions which may not allow the utilities to pass this cost along to the ratepayer. Without the ability of utilities to demonstrate to the rate commissions that such federal action was balanced in the overall interest of the ratepayer, the utilities will have a difficult time convincing the rate setters to pass along this additional cost.

c) Question: Does ANEC have any data on how high those costs might be for domestic content requirements ranging from 50 percent to 80 percent?

Answer: No, ANEC has not undertaken or performed any independent analysis of the potential cost impacts.

d) Question: Does ANEC agree that the increased cost, if any, is commensurate to the benefit derived form assuring a secure and reliable domestic source of nuclear fuel?

Answer: Based on rough cost estimates of others, ANEC believes that S.1004 provided a comprehensive, equitably balanced legislative package in which the increased costs of uranium supply to utilities was balanced by the benefits derived in assuring a secure and reliable domestic source of nuclear fuel as well as a competitive and viable U.S. enrichment program.

5) Question: Section 161v. of the Atomic Energy Act requires the Atomic Energy Commission, now the Department of Energy, to "assure the maintenance of a viable domestic uranium industry." In your view, is that a onetime only obligation, or a continuing obligation?

Answer: That portion of Section 161v. of the Atomic Energy Act that addresses the need to maintain a viable domestic uranium industry was added in 1964 and remains a permanent part of the Atomic Energy Act. Certainly, the national and international markets for uranium and enrichment services have changed significantly since that time.

However, it remains in the long-term interest of both electricity customers and the citizens of the U.S., generally, to have the reliability and diversity of an on-shore domestic uranium production and enrichment capability. Clearly, steps must be taken to maintain this capability as a hedge against possible foreign embargoes, cartels and other unfair foreign trade practices.

6) Question: Does ANEC support legislation to provide for the federal government to pay its fair share of the costs of reclaiming tailings associated with old contracts with the Atomic Energy Commission at so-called "commingled" tailings sites?

Answer: Yes, ANEC supports a legislative package similar to S.1004 which requires the federal government to pay a fair share of the costs to reclaim "commingled" tailings.

a) Question: Does ANEC support legislation to require U.S. utilities to contribute to the reclamation expenses of commercial tailings at all existing tailings sites?

Answer: As stated in my testimony, claims that the utilities are obligated to pay additional cleanup expenses under original contract agreements are subject to challenge. However, as part of a total comprehensive legislative package, ANEC supports a national mill tailings cleanup program at active sites funded through an equitable cost sharing arrangement among states, the federal government, uranium producers as well as utilities.

b) Question: If ANEC supports either kind of legislation, or both, should that legislation also cover mill decommissioning costs and if not, why not?

Answer: ANEC has not undertaken any analysis to determine the cost or burden of responsibility for mill decommissioning costs.

QUESTIONS FOR ED DAVIS

FROM: SENATOR PETE DOMENICI

1. Question: In terms of total annual operating costs at a typical nuclear power plant, what percentage of that cost is attributed to the costs of purchasing uranium ore? In terms of electricity rates, what portion of that rate is attributed to costs of purchasing uranium ore?

Answer: ANEC has not undertaken specific analysis inorder to specify what percentage of the total annual operating costs at a typical nuclear power plant are attributed to the costs of purchasing uranium ore. Nor has ANEC performed any analysis to determine what portion of electricty rates is attributed to costs of purchasing uranium ore. It is my understanding that the Edison Electric Institute will be submitting rough estimates to address this specific question.

2. Question: Concerning utility contributions toward mill tailings cleanup costs, the proposal in last year's bill (S.1004) would have assesed utilities $22 per kilogram of uranium loaded into the reactor from 1989-1993.

a) Assuming this cost was passed on to the ratepayer, how would this affect a ratepayer's utilitiy bill?

Answer: As indicated in the previous answer, ANEC has not undertaken specific analysis inorder to determine the financial impacts to electricity ratepayers should specific costs in the nuclear fuel cycle process be increased.

b) Why do you want these payments to be qualified as "current deductions for Federal tax purposes" (as you have proposed in your testimony)? Would this kind of accounting arrnagement be considered normal practice?

Answer: It is the general understanding within the industry that, under Internal Revenue Service regulations, contributions to the mill tailings fund cannot be treated as deductions until the completion of the cleanup. Therefore, only if congress qualifies the funds as "current deductions for federal tax purposes" will utilities be allowed to deduct tax purposes annually for the funds expended to the mill tailing fund. The tax treatment requested for utilities contributions to the mill tailings fund is consistent with the existing treatment of utility contributions to the nuclear waste fund.

THOMAS R. KUHN, Executive Vice President

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April 6, 1987

The Honorable Wendell H. Ford
Chairman
Subcommittee on Energy Research
and Development
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

Enclosed are the answers to the follow-up questions from your March 9, 1987 hearing on the current status of the domestic uranium mining industry.

We appreciate the opportunity to provide this important information to your Subcommittee.

Sincerely,

Thomas R. Kuhn

TRK:sph
Enclosure

FOLLOW-UP QUESTIONS
HEARING ON URANIUM MINING AND MILL TAILINGS RECLAMATION
FROM SENATOR WENDELL FORD
QUESTIONS FOR TOM KUHN (Utilities)
March 9, 1987

1. The electric utility industry supported S. 1004, the bill reported last year by the Committee, as I understand it, because you want to see the uranium enrichment enterprise put back into a business-like situation. You had to accept a bill with import restrictions and mill tailings cleanup costs in it as a price of getting the legislation to move.

   a) How should the costs of cleanup of uranium mill tailings be apportioned?

ANSWER:

Utilities believe they have already paid their fair share of the costs for the stabilization of mill tailings, however, they are willing to provide reasonable contributions to a mill tailings fund in the context of fair, comprehensive uranium supply and enrichment legislation. Comprehensive uranium legislation (S. 1004) considered last year originally attempted to apportion the amount of up to $5.00 per ton of mill tailings reclamation, for tailings from both Federal and commercial sales, such that the uranium producers would have paid 30%, the Federal Government would have paid 30%, the utilities would have paid 30%, and the applicable states would have paid 10%. This appeared to be a reasonable apportionment. The version finally reported out by the Senate Energy Committee provided a limit on the payments of $4.50 per ton of tailings with about 20% paid by the uranium producers, 40% paid by the Federal Government, and 40% paid by utilities.

A simplified version could be provided with the Federal Government paying up to a maximum of $4.50 per ton for those tailings associated with the non-commercial uranium sales (as provided in the reported S. 1004 last year), uranium producers paying up to the first $1.50 per ton for those tailings associated with commercial sales, followed by payment from funds supplied by utilities for the costs between $1.50 and $4.50 per ton for those tailings associated with commercial sales, and all costs above $4.50 per ton associated with all existing mill tailings paid by the uranium producers. Any allocation assigned to electric utilities should be a fixed amount based on new fuel loaded or fuel discharged from operating nuclear plants within a specified time period, such as five years.

b) How do you respond to a bill that would contain import restrictions or a requirement for paying for uranium mill tailings cleanup?

ANSWER:

Utilities have indicated that they are willing to work with the Congress to develop an equitable solution to all the issues relating to uranium supply and enrichment; the issues are interrelated inasmuch as they all affect fuel costs which ultimately must be paid by electric ratepayers. A comprehensive bill must fairly balance the savings in eliminating the unwarranted DOE "prior unrecovered cost" value to the U.S. Treasury plus reducing DOE enrichment prices through restructuring that enterprise, against the additional costs which will be incurred in providing relief to the uranium supply industry. Such a bill, however, might use a solution other than a restriction on foreign origin uranium. One possible alternative may be to offer matching sales of uranium from the U.S. stockpile to domestic producers for uranium actually mined and milled in the U.S. to average down production costs.

2. Do you believe that the maintenance of a viable domestic uranium mining and milling industry is in the national interest?

   a) If not, why not?

   b) If so, what should we be doing to bring this about?

ANSWER:

The maintenance of a reasonable level of domestic uranium mining and milling production is in the national interest.

To best serve their customers, utilities must consider both price and reliability of supply. They believe that a reasonable level of domestic production can exist in an open, competitive world market. If the Federal government has identified a national security concern relating to the domestic uranium production level, then responsibility to provide relief to the industry should rest with the nation's taxpayers and not the electric ratepayers. The requirements for DOE to restrict the commercial enrichment of foreign origin uranium contained in Section 161v of the Atomic Energy Act should be removed with the establishment of fair comprehensive uranium supply and enrichment legislation.

3. Shouldn't ratepayers who benefitted from nuclear power share in the cost of reclaiming mill tailings sites?

   a) If not, why not?

b) If so, how?

ANSWER:

As noted before, utilities believe they have already paid their fair share of the costs for the stabilization of mill tailings that result from commercial sales of uranium, through the relatively high prices that were paid when the uranium was purchased. Much uranium sold to electric utilities from the mid 1970's to date was under contracts with prices significantly greater than current spot market prices. Therefore, most of these costs should be paid by the states, the Federal government, and the uranium producers.

Ratepayers have benefitted from nuclear power and will only continue to benefit if this source is not "taxed" with a variety of inappropriate costs.

4. What are your estimates of the costs of reclaiming the so-called active mill tailings sites covered by last year's version of S. 1004?

ANSWER:

Utilities do not have the expertise to estimate the costs of stabilizing mill tailings. However, a mill tailings fund based on a cost of $4.50 per ton appears to be higher than necessary in light of recent filings made to the NRC by uranium producers from New Mexico, and the UPA testimony given at the March 9, 1987 hearing.

5. Do either of you believe that the recently released National Academy of Sciences study on uranium mill tailings justifies a new look at EPA regulations for mill tailings reclamation? Explain.

ANSWER:

EEI does not have technical expertise in the stabilization of mill tailings. Based on our limited review of the National Academy of Sciences study, it would appear that there may be some basis for a new look at the current EPA regulations.

6. Do you believe that justifiable changes in the regulations could reduce the cost of the cleanup? How much?

ANSWER:

Justifiable changes in the EPA regulations regarding mill tailings stabilization, which would not compromise the health and safety of the public, should be implemented as a method for reducing the costs which will be incurred and thus to increase the competitiveness of the domestic uranium industry. EEI does not have the expertise to provide cost estimates on mill tailings stabilization and, therefore, cannot estimate the savings.

FOLLOW-UP QUESTIONS
EEI and ANEC
FROM SENATOR DOMENICI
March 9, 1987

1. In terms of total annual operating costs at a typical nuclear power plant, what percentage of that cost is attributed to the costs of purchasing uranium ore? In terms of electricity rates, what portion of that rate is attributed to costs of purchasing uranium ore?

ANSWER:

In 1985, the average total generating cost for nuclear power was approximately 4.3¢/kwhr of which 0.7¢/kwhr was attributed to fuel cost. The cost of uranium ore represents roughly 30 to 40% of fuel costs. Based on 1985 costs, this would come out to about 0.25¢/kwhr, or nearly 6% of the cost of nuclear generation.

Nuclear power generated approximately 384 billion kwhrs of electricity in 1985. Assuming an average cost of 0.25¢/kwhr uranium ore represented a total cost of about $960 million.

2. Concerning utility contributions toward mill tailings cleanup costs, the proposal in last year's bill (S. 1004) would have assessed utilities $22 per kilogram of uranium loaded into the reactor from 1989-1993.

   a) Assuming this cost was passed on to the ratepayer, how would this affect a ratepayer's utility bill?

ANSWER:

We estimate that the $22 per kilogram charge would result in a total cost to the utilities over the five year period of roughly $300 million, or $60 million per year. Assuming an operating capacity of 100,000 megawatts, for a 1,000 megawatt plant this equates to about $600,000 per year that would be passed on to ratepayers.

   b) Why do you want these payments to be qualified as "current deductions for Federal tax purposes" (as you have proposed in your testimony)? Would this kind of accounting arrangement be considered normal practice?

ANSWER:

Under Internal Revenue Service regulations, deductions such as the contributions to the mill tailings fund cannot be taken until the "all events test" has been passed. The final element of the "all events test" is economic performance, which in this case would be the actual physical completion of the tailings stabilization. Since no date was specified for actual completion of stabilization, utilities could not deduct their contributions for an indefinite period of time, unless the contributions were specifically qualified as "current deductions for Federal tax purposes."

3. (EEI's Tom Kuhn) You imply that it would be difficult to argue a rate case that involved higher fuel costs associated with uranium import restrictions. Would it be any easier to argue a rate case where you found yourselves totally dependent on foreign sources of uranium and therefore subject to the arbitrary whims of that country's trade and pricing policies? Don't you think that, in the long run, an assured source of domestic fuel supply is justifiable and in the best interest of your customers?

ANSWER:

As I indicated in my testimony, utilities do recognize that some portion of domestic supply is desirable to achieve maximum dependability in assuring a reliable supply of uranium. Prudent management clearly requires careful consideration balancing of both price and reliability of supply.

URANIUM PRODUCERS OF AMERICA
1201 PENNSYLVANIA AVENUE, N.W.
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WASHINGTON, D.C. 20044

April 7, 1987

The Honorable Wendell H. Ford, Chairman
Subcommittee on Energy Research
and Development
SH 312, 2nd & C Streets, NE
Washington, D.C. 20510

Dear Senator Ford:

On behalf of the Uranium Producers of America, I want to thank you for the opportunity to present the industry's views at the March 9, 1987 hearing on the status of the domestic uranium mining industry. You will find enclosed with this letter my response to your follow-up questions and those questions from Senator Domenici.

We understood from discussions with your office that an extension of the deadline to April 10th would be acceptable.

Thank you for your interest in rebuilding a healthy domestic uranium industry in the United States.

Very truly yours,

Robert P. Luke

Robert P. Luke
President

RPL:sjf
Enc.

cc: Senator Peter V. Domenici w/enc.
Room 434
Dirksen Senate Office Building
1st & C Streets, N.E.
Washington, D.C. 20510

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QUESTIONS FROM SENATOR WENDELL FORD

Question 1:

Are the producers and miners helped by restrictions on the importation of foreign uranium, or as some contend, would restrictions only cause utilities to seek both natural uranium and enrichment service abroad?

Answer:

The producers and miners would be helped by a meaningful uranium usage requirement. By requiring a fixed percentage of the uranium loaded into civilian nuclear reactors to be of domestic origin the market for United States produced uranium would be increased. The specific share of the domestic usage requirement should be tailored to existing and future market conditions. The usage requirements must be sufficient to assure and maintain the viability of the domestic uranium mining and milling industry. We believe the fifty percent uranium usage requirement we supported in S.1004 needs to be increased due to foreign commitments and nationality swaps that have occurred.

It is highly unlikely the United States nuclear utilities would or could seek to purchase both natural uranium and enrichment services from abroad in the event of the enactment of a domestic usage requirement. The DOE presently has under contract over 90% of the domestic enrichment business. We believe that these contracts cannot be terminated for approximately another ten years. This would preclude a wholesale exodus by the utilities to purchase natural uranium and enrichment of foreign origin. Further, there does not currently exist enough excess foreign enrichment capacity to handle all or even a major share of DOE's enrichment business. DOE is several years ahead of its foreign enrichment competitors in the development of advanced technology which will reduce the cost of enrichment. It is unlikely that foreign enrichment producers would make capital investments to increase existing enrichment capacity, when advances in technology are not that many years away.

The DOE's advanced technology may significantly reduce the price of its enriched product. This would more than offset any increase in the cost of natural uranium. The recent decline in the value of the doliar has also made DOE more competitive with its foreign counterparts.

The uranium producers believe that the domestic nuclear utilities recognize the need for stable and viable domestic producting and enrichment industries. The utilities should be aware of the importance of not relying too heavily on the policies of foreign governments for products so vital to our nation's energy independence.

Question 2:

Is it true that the producers association has done an extensive site by site, survey of tailing at all "active" sites covered by S. 1004? Can you explain the methodology and the results of your survey, specifically, the cost per ton to clean up these sites?

Answer:

The Uranium Producers of America prepared a Directory of Active Uranium Mill Tailings Sites in the United States in July 1985. The report was compiled from information obtained in a survey of United States uranium producers by the Uranium Producers of America and from the *Directory and Profile of Licensed Uranium - Recovery Facilities*, United States Nuclear

Regulatory Commission NUREG/CR-2869 (March 1984). Additional information is currently being developed as some owners of active sites are in the process of filing proposed reclamation plans with the Nuclear Regulatory Commission. As the NRC reviews and comments on these plans, actual cost estimates will become more definite. A list of the active sites with approximate tonnages of mill tailings is attached to this answer.

The DOE testified in a joint hearing before the House Interior Committee and the Senate Energy Committee on July 16, 1985 that it projected the cost of reclamation of the active sites to be approximately $4 billion. This projection was based upon DOE's reclamation work on inactive sites. The DOE's projections failed to take into account any reduction in cost for economy of scale. The survey conducted by the UPA in July, 1985 resulted in estimates ranging from $1.00/ton to as high as $16.00/ton. This wide range occurs due to the difference in size of the tailings piles and the fact that other conditions at the active sites vary.

The tailings reclamation legislation supported by the Uranium Producers of America establishes $4.50/ton as a limit for amounts paid from the Uranium Mill Tailings Fund at each active site. If the cost exceeds $4.50/ton the excess is the responsibility of the owner or licensee of the site. The legislation also provided that if the cost of reclamation is less than $4.50/ton the difference between the $4.50 limit and the actual cost per ton is refunded on a site by site basis. The $4.50 per ton limitation is not an average cost but rather a cost per ton figure that should accomplish the task of reclaiming a majority of the active sites.

The amount per ton established as a limit for the uranium mill tailings fund should be sufficient to cover the cost of reclaiming tailings at most of the active sites as required by federal regulations. Under the provisions of the funding mechanism in Title II of S. 1004, the owners and licensees of the active sites would be motivated to accomplish the reclamation at the lowest possible cost according to the regulations. This is due to the fact that the owners would be obligated at all times to pay one-third of the total cost. The lower the total cost, the lower the owner's share and the greater the refund to the Federal government.

Question 3:

In a briefing paper done by the General Accounting Office (GAO) and submitted for the record of our Subcommittee hearing in July 1985, GAO, using data obtained from the Nuclear Regulatory Commission (NRC), estimated that the cost per ton of cleaning up the tailings was approximately $1.36/ton.

- Why is your estimate so much higher than that?
- Can you describe some of the key uncertainties in your analysis which leads to such a broad range of costs for the reclamation of these sites?
- What are the important factors to consider when making an estimate of mill tailings cleanup costs?
- Does the cost depend upon the level of health risk?

Answer:

The NRC study relied upon by the GAO is inaccurate in that the study is partially based upon standards and regulations which are no longer in existence. Other regulations, such as the NRC groundwater regulations, were adopted after the NRC estimates. Some of these estimates were based on area reclamation rather than a cost per ton. The NRC study in some instances included both tailings reclamation and mine reclamation. Finally, in several instances mill decommissioning was not included in the estimated costs.

As an example, the NRC study estimated the costs for Homestake Mining at $0.24 per ton. This estimate was based on regulations promulgated by the State of New Mexico rather than the EPA - NRC regulations which now apply to the site. The EPA - NRC standards are more stringent and costly than the New Mexico standards. A comparison of sites in the NRC study exhibits the questionability of the estimates. TVA-Edgemont with a volume of 3.2 million tons is estimated to cost $8.56 per ton for reclamation. Bear Creek with 3.7 million tons has an estimated cost of only $0.70 per ton. A July 1985 study conducted by the Uranium Producers of American found estimated costs at TVA-Edgemont now at $16.00 per ton.

The key uncertainties which lead to a broad range of cost estimates are the different control regulations applied by the estimator. The DOE, NRC and Agreement States all have different control regulations. Many of these have undergone change over the years. Some estimates are done on an area basis while others estimate cost per ton. Economy of scale can be a major factor in estimating costs. The uranium producers believe that a funding mechanism with a realistic limitation of reimbursement, such as $4.50 per ton, together with a refund provision will encourage the most efficient, equitable reclamation possible at the active sites.

There are several important factors to consider in making an estimate of mill tailings cleanup costs. These factors include conditions of the site, such as likelihood of groundwater pollution, and proximity to cover material. The geology of the site and the extent of probability that the site could be affected by flooding are also key factors.

As the regulations are currently structured, the cost of reclamation does not depend on the level of health risk. As pointed out by the National Academy of Sciences study the costs of reclamation are not justified under the present regulations by the level of health risk nor are they supported by site specific analysis. Until the level of health risk is determined on a site specific basis, this will continue to be the case.

Question 4:

The National Academy of Sciences published a study in 1986 which concludes among other things, that health risks of uranium mill tailings to the average citizen are trivial. The EPA, which issued regulations in 1983 for standards for mill tailings cleanup, does not believe that the study provides a basis for reconsidering their standards.

Would you please comment on the study, as well as on the effect of the EPA regulations on the cleanup costs of the tailings.

Answer:

The NAS Study provides an appropriate review of current EPA regulations relating to mill tailings reclamation. We would urge that these regulations be reconsidered in light of the NAS Study.

We agree with the NAS Study that the cost benefit of any regulations should be considered. The NAS Study correctly points out that a site-specific approach to tailings reclamation should be followed.

The uranium producers have no choice but to follow the standards promulgated by government agencies. The industry has contested these standards in the past as excessive, making many of the same arguments which are accepted in the NAS Study.

The EPA regulations which were not adopted until 1983 greatly increased the cost of mill tailings reclamation. Prior to these regulations, the producers had not considered large reclamation costs when pricing their product. In many instances the regulations are not cost effective for the level of risk involved. As an example, the EPA regulations require protection against large, catastrophic floods rather than against local periodic floods. As noted by the NAS Study, the EPA approach is neither feasible nor warranted from the risk presented.

Question 5:

Last year this Committee reported out S. 1004 which contained cost sharing of approximately 37% of the funds coming from the site licensees, 37% from the utilities, and approximately 25% coming from the Federal government.

How do you think mill tailings cleanup costs should be apportioned?

Answer:

The uranium producers support a funding system designed to allocate the costs of reclamation among those who reaped the benefits from uranium produced at the active sites. The nuclear utilities, of course, benefitted from uranium produced for use in nuclear reactors. The Federal government benefitted from uranium produced for defense programs. Approximately 30% of the mill tailings at active sites were generated under Government contracts. The uranium producers did not include major reclamation costs in pricing uranium because no such costs were anticipated when most of the tailings were generated. In fact, during the entire period when uranium was being produced for defense programs, up until 1970, potential health hazards were not recognized and extensive reclamation requirements did not exist. The GAO recommended in a report dated February 5, 1979 that Congress provide assistance to the active site owners for the reclamation of tailings generated under Federal Contracts. When the EPA adopted reclamation regulations in 1983, the contracts under which over 90% of the mill tailings located at the active sites were generated had already been signed. The mill owners had no opportunity to share these costs with their customers. In light of this history, it is appropriate that the federal government, nuclear utilities, and producers participate in the funding of mill tailings reclamation according to the funding formula adopted by the Senate Energy Committee in 1986.

The uranium producers support a funding system which allocates the cost of reclamation on an approximate one-third basis between the federal government, nuclear utilities and the owners of active sites. S. 1004 which was reported out by the Committee last year contained provisions that the owner of the active site would always pay one-third of the reclamation cost. The federal government was to contribute $300 million dollars. The nuclear utilities were to contribute $22.00 per kilogram of uranium contained in fuel assemblies initially loaded into each civilian nuclear power reactor during 1989-1993. Utility representatives represented that this contribution would produce approximately $300 million for the Tailings Fund. S. 1004 also provided a $4.50 per ton limitation on reimbursement from the Tailings Fund to achieve the reclamation at the majority of the active sites. At sites with costs in excess of the limitations, the owners would be responsible for all of the excess costs. This resulted from discussions with representatives of the nuclear utilities and Senator Metzenbaum. The limitation together with the funding formula set forth in S. 1004 would provide adequate funding for the Mill Tailings Fund to achieve the reclamation at the majority of the active sites. At sites with costs in excess of the limitation, the owners would be responsible for all of the excess costs. Because these costs would have been shared by the Federal government and nuclear utilities had they been imposed at the outset, it is entirely appropriate that an equal sharing be implemented at this time.

TAILINGS AT LICENSED MILLS

MILL	TAILINGS (10^6 TONS)		
	AEC	COMMERCIAL	TOTAL
Cotter - Cannon City	0.3	1.9	2.2
UMETCO - Uravan	5.7	4.6	10.3
Sohio - Seboyeta, NM	0.0	2.1	2.1
UNC - Churchrock	0.0	3.5	3.5
Anaconda - Bluewater	8.8	14.8	23.6
Kerr-McGee - Ambrosia Lake	10.0	23.0	33.0
Homestake - Milan	11.4	10.4	21.8
TVA - Edgemont	1.6	0.4	2.0
Conoco - Falls City	0.0	8.8	8.8
Chevron - Panna Maria	0.0	4.6	4.6
Exxon - Ray Point	0.0	0.4	0.4
Rio Algom	0.0	3.0	3.0
Atlas - Moab	5.9	4.6	10.5
Dawn - Ford	1.2	1.8	3.0
Western Nuclear - Wellpinit	0.0	2.9	2.9
Federal American - Gas Hill	2.1	3.8	5.9
Pathfinder - Gas Hills	2.8	6.7	9.5
Western Nuclear - Jeffrey City	3.3	4.4	7.7
UMETCO - Gas Hills	2.1	7.1	9.2
Exxon - Powder River	0.0	7.2	7.2
Rocky Mountain Energy - Powder River	0.0	5.0	5.0
Pathfinder - Shirley Basin	0.0	5.8	5.8
Petrotomics - Shirley Basin	0.7	4.8	5.5
Energy Fuels - Blanding	0.0	1.9	1.9
Minerals Exploration - Red Desert	0.0	1.0	1.0
UMETCO - Maybell	0.0	2.0	2.0
TOTALS	56.0	137.2	193.2

URANIUM PRODUCERS OF AMERICA
1201 PENNSYLVANIA AVENUE, N. W.
P. O. BOX 7566
WASHINGTON, D. C. 20044

QUESTIONS FROM SENATOR PETER DOMENICI

Question 1:

What evidence do you have concerning subsidies and/or unfair trade practices with respect to their uranium market? What about the Australian uranium market? Do you think that the U.S. Trade Representative was lax in his duties to investigate such matters? Has the uranium industry filed any petitions on its own to force these investigations?

Answer:

The Canadian government supports its uranium industry in several ways. One hundred percent of Canadian uranium requirements are supplied under required 30-year purchase contracts from Canadian mines. There is a very significant price differential between Canada's high home market prices and Canadian prices in the United States. It has been reported in the trade press that the Canadian home market price for uranium exceeds $60 per pound and the price charged for Canadian uranium sold in the United States averages less than $20 per pound. This constitutes an enormous subsidy for higher cost Canadian producers. Sales in the United States at prices so far below home market prices are unlawful under the United States anti-dumping statute.

The Canadian government and the provincial governments of Saskatchewan and Ontario have poured large amounts estimated to be more than $1 billion into the Canadian uranium industry in the last few years.

These financial subsidies take several forms such as:

- Government contributions in the range of $300 million in uranium from government stockpiles to producers in return for stock.
- Forgiveness of government loans to producers.
- Equity advances and provincial government guarantees of producer's long term debts.
- Interest free loans.

Export contracts of Canadian uranium require floor prices which protect investment and employment. The prices and terms of all Canadian export contracts must be approved by the Canadian government and reviewed annually. Canadian uranium must be upgraded to UF_6 before export. Non-resident ownership in uranium properties in Canada is limited to 33%. Canada allocates Canadian requirements among its producers.

Attached is a summary of Canadian uranium policies from the *Uranium Resources Production and Demand* (IAEA Red Book), a joint report by the OECD Nuclear Energy Agency and the National Atomic Energy Agency, 1986. The Canadian report was prepared and submitted by responsible officials of the Canadian government.

The Australian government imposes a floor price on export contracts, and also requires government review and approval of these contracts. The Australian government limits foreign ownership of Australian uranium reserves.

The uranium producers have seen little evidence that the U.S. Trade Representative has taken any action to investigate unfair trade practices involving uranium. At a conference on trade issues affecting the minerals industry hosted by Senators Domenici and Bingaman in 1985, the USTR official indicated no knowledge of trade practices in the uranium area. The

U.S. Trade Representative advised the Secretary of Energy in December 1985 that "any remedy granted under existing law which might provide the extent of relief requested by the industry would only be short term, while at the same time having an adverse impact on our trade and other relations with important trading partners . . . ."

We would observe generally that no portion of the U.S. government appears to be willing to assume responsibility to monitor foreign trade practices with respect to the uranium industry. Responsibility for this activity in other areas ordinarily rests with the Commerce Department. However, that Department takes the position that it is the responsibility of the Department of Energy as the successor to the Atomic Energy Commission and as the agency responsible for assuring the maintenance of a viable domestic uranium industry under 42 U.S.C. 2201v. Since the disbandment of the Grand Junction Office in the early 1980's, no one at DOE has discharged this function. Quite literally, the Executive Branch has no official or office responsible for monitoring foreign trade practices affecting the domestic uranium industry, even though such a function is necessary to carry out DOE's Atomic Energy Act responsibilities.

The uranium industry has considered filing a petition to investigate unfair trade practices but because Section 161 (v) of the Atomic Energy Act is already in place, we feel that seeking the enforcement of that law is a better approach. The Department of Energy is required by Section 161(v) to maintain a viable domestic producing industry. If the Department of Energy would comply with existing statutory requirements there would be no need for a trade action. The uranium producing industry is in such a precarious state that it might collapse as did the copper industry, before a finding of unfair trade practices could be reached. Further, under existing trade laws, relief is not mandatory even with a finding of unfair trade practices. Given the Canadian government's demand that Canada be exempted from U.S. trade remedy laws as reported in the April 3, 1987 *Wall Street Journal*, the producers feel that enforcing existing law is the best approach to retaining a viable industry.

Question 2:

EEI's testimony alludes to the fact that some of the mill tailings remedial action work could be performed for less than $1 per ton, in contrast to the $4.50 "reference" figure we used in last year's bill. Do you agree that some sites could be cleaned up for $1 per ton or less? If so which sites are these? What makes them cheaper? Can we be assured that the mining company responsible for reclamation will keep these costs as low as possible (without, of course, violating the NRC and EPA regulations)?

Answer:

The company responsible for reclamation has a tremendous incentive to keep the cost of reclamation as low as possible under a funding mechanism like that set forth in S. 1004. This is because the company's share is always one-third of the total cost of reclamation. The lower the cost the lower the company's share.

Some companies have recently submitted reclamation plans to the NRC with projected costs of reclamation at approximately $1.00 per ton. These plans have not yet been approved. Other projected costs are as high as $12-16.00 per ton for reclamation. Certainly the DOE reclamation of inactive sites has been far in excess of $1.00 per ton.

The $4.50 figure used in S. 1004 is a maximum amount that can be reimbursed at any one active site. It is not an average cost but a sound estimate of the cost per ton that will achieve total reclamation at most of the active sites. Some sites because of their size, location, and geologic situation will cost more on a per ton basis. S. 1004 provides that of these sites the owner would be responsible for any excess over $4.50 per ton. S. 1004 also provides for refunds on a site by site basis, after the actual cost of reclamation is determined. As previously noted, the $4.50 per ton limitation and the funding mechanism will provide incentive to the owner of the site to accomplish reclamation at the lowest possible cost while meeting the NRC and EPA regulations.

Excerpt from Uranium Resources Production and Demand (IAEA Red Book) A Joint Report by the OCED Nuclear Agency and the National Atomic Energy Agency, 1986

NATIONAL POLICIES RELATING TO URANIUM

Policy on Participation of Foreign Companies

There are no restrictions on foreign investment in Canada's uranium industry at the exploration stage. Upon reaching the production stage, however, a uranium project must comply with federal government policy designed to limit non-resident ownership in new uranium production operations. The latest enunciation of this policy is contained in The Uranium and Thorium Mining Review Bill (C-64), introduced into Parliament in 1978 but never passed. Bill C-64 would limit aggregate non-resident ownership of a uranium mining property to a maximum of 33 per cent, but would permit non-resident ownership up to a limit of 50 per cent if it can be demonstrated that the property is Canadian-controlled or, alternatively, if the development of the property is deemed to be a significant benefit to Canada.

In January 1984, the Minister of Energy, Mines and Resources extended to the industry the opportunity to defer the application of the ownership limitations for three years beyond first production.

This policy is currently being re-examined with a view to bringing it into line with government policy on foreign ownership in other areas, and to assure that it is simpler and more easily understood. The current Conservative Government, elected in September 1984, has indicated that it welcomes foreign investment and wants to encourage the development of Canadian resources. In this context, on June 30, 1985, the Investment Canada Act was proclaimed. The purpose of the new Act is to encourage investment in Canada, that contributes to economic growth and employment opportunities, and to provide for the review of significant investments in Canada by non-Canadians in order to ensure sucn benefit to Canada.

Policy on Activities in Foreign Countries

Since Canada is a net exporter of uranium, there is no need to encourage national companies to invest abroad in uranium exploration and development projects. Canadian companies are free, however, to pursue such activities and have been involved in uranium programmes in several countries.

Responsible Canadian Authorities

Canada's Atomic Energy Control (AEC) Act gives the Federal Government jurisdiction over Canada's uranium industry. The Act deals primarily with health, safety, security and environmental concerns. The Atomic Energy Control Board (AECB) administers the AEC by means of a licensing system prescribed in its regulations. Licensing of uranium activities normally commences at the stage where removal of uranium in excess of 10 kg per year in involved, from concentrations exceeding grades of 0.05 per cent U. In the federal sphere, the Department of Energy, Mines and Resources is normally the lead agency for policy matters affecting the uranium industry, particularly those of a commercial nature such as foreign ownership and exports.

In common with other minerals, uranium resources are owned by the provinces and activities such as prospecting and land aquisition are matters of provincial jurisdiction. The regulations for these activities vary amongst the ten provinces and two federal territories. Many aspects of uranium exploration and production activity are also subject to provincial regulations, compliance with which is a prerequisite for the issuance of the appropriate AECB licences mentioned above. Key provincial departments are as follows:

- Department of Mines and Energy - (St. John's, Newfoundland)
- Department of Mines and Energy - (Halifax, Nova Scotia)
- Department of Natural Resources - (Fredericton, New Brunswick)
- Department of Energy and Forestry - (Charlottetown, Prince Edward Island)
- Ministère de l'Energie et des Ressources - (Québec, Québec)
- Ministry of Natural Resources - (Toronto, Ontario)
- Department of Energy and Mines - (Winnipeg, Manitoba)
- Saskatchewan Energy and Mines - (Regina, Saskatchewan)
- Department of Energy and Natural Resources - (Edmonton, Alberta)
- Ministry of Energy, Mines and Petroleum Resources of the Province of British Columbia - (Victoria, British Colombia)
- Department of Indian and Northern Affairs -for Northwest Territories and Yukon - (Ottawa, Ontario).

Uranium Export Policy

Canada's uranium export policy has been developed with a view to maintaining Canada's role as a reliable uranium supplier to its industrial partners over the long term, while seeking to ensure adequate supplies for domestic needs, to increase the return to Canadians from exportable surpluses, and to realize opportunities for further processing. There is also the special overriding requirement that Canada's uranium be used for peaceful non-explosive purposes only. A broad range of countries, many of which import Canadian uranium, have entered into bilateral nuclear co-operation agreements with Canada, and have ratified the Non-Proliferation Treaty or made an equivalent non-proliferation commitment and accepted international safeguards on all of their nuclear activities.

Mechanisms are in place to monitor Canada's uranium supply capabilities and export commitment levels, to ensure that sufficient uranium is available to meet the 30-year fuelling requirements of all Canadian nuclear power reactors for a rolling ten-year period. Canada's currently assessed uranium resources are more than adequate to meet these requirements. Export contracts can be approved normally for periods of up to 15 years. However, in cases where the exports are associated with the sale of a CANDU reactor, contracts can be approved that provide that reactor with a 30-year supply of fuel.

All uranium export contracts are required to contain floor prices or similar mechanisms, which protect investment and employment in the uranium production facilities, and pricing terms that provide for an equitable balance of benefits and risks and that are in general agreement with those being obtained by Canadian and international producers for uranium under contracts of similar duration. Except under exceptional circumstances, uranium must be upgraded to the maximum extent possible in Canada before export, as long as Canada's conversion facilities have the capacity and are generally competitive. In practice, this means refining and conversion to uranium hexafluoride (UF_6).

Canadian producers are free to negotiate their own contracts, within the context of current Canadian export policy, but all export contracts are subsequently reviewed by federal government authorities to ensure that they meet the intent of the policy objectives. For contracts that are found to be consistent with these objectives, export licences and export permits are obtained annually from the Atomic Energy Control Board and the Department of External Affairs, respectively, pursuant to the provisions of the Atomic Energy Control Act and the Export and Import Permits Act.

Uranium Import Policy

Since Canada is a net exporter of uranium, import policies governing uranium have not been developed, and tariff or non-tariff barriers with respect to the import of uranium products have not been established.

Uranium Stockpile Policy

Canada has implemented domestic stockpiling programmes in the past, in order to maintain a nucleus of production and employment during periods of depressed markets. The last such programme was completed in 1974. A portion of the uranium accumulated under these past programmes was sold on the export market in the early 1970s, and the remainder, 5 570 t U was transferred to Eldorado Nuclear Limited in March 1981. The bulk of this inventory was exchanged in 1982 by Eldorado for title to the Rabbit Lake producing facility and its associated properties, then owned by Gulf Minerals Canada Limited and Uranerz Canada Limited. No further uranium stockpiling programmes are currently contemplated.

CENTRAL AFRICAN REPUBLIC

URANIUM EXPLORATION

Historical Review

The French CEA initiated prospecting for uranium in 1947, exploring the crystalline formations in the western and central part of the Central African Republic, but without success.

THE WALL STREET JOURNAL FRIDAY, APRIL 3, 1987

Canada Demands Exemption From U.S. Trade Laws

By John Urquhart
Staff Reporter of The Wall Street Journal

OTTAWA — Canadian Prime Minister Brian Mulroney demanded that Canada be exempted from U.S. trade remedy laws as part of a proposed free trade agreement between the two countries.

"Trade remedy laws can't apply to Canada. Period," he told a group of reporters. Mr. Mulroney intends to take up the trade issue when President Reagan comes here Sunday for his annual summit meeting with the Canadian leader.

The two leaders are expected to discuss strategies for winning broad support for the proposed trade pact, which is designed to break new ground in dismantling barriers to trade in goods and services.

Canada has long complained that U.S. trade remedy laws, particularly the countervailing duty law, have been used by various U.S. interests to harass Canadian exporters to the U.S. Trade remedy laws provide protection from imports of subsidized and dumped products.

"You can't have a free trade arrangement and expect the traditional laws of countervail to apply," Mr. Mulroney said. Such laws, he said, "can be triggered by any disgruntled group in the U.S. at any given time."

He said "it would be illogical in the extreme to negotiate" a free trade arrangement "and then have the other side say 'Oh, and by the way, we forgot to tell you all of our nice little tricks on countervail and what-have-you we are going to keep.' " He said there has to be a bilateral mechanism for settling disputes "equitably and in an agreed-upon manner."

U.S. government officials warned that Congress is unlikely to accept an exemption for Canada from U.S. trade remedy laws. But they said various options are being explored to soften the impact of the laws on Canada.

Philip Trezise, a senior fellow at Brookings Institution in Washington and a former senior U.S. trade negotiator, said that

Please Turn to Page 10, Column 2

Canada Tells U.S. It Wants Exemptions From Trade Laws

Continued From Page 1

as part of the proposed trade agreement a new U.S.-Canadian agency could be established to resolve trade grievances. Others have said such an agency could be patterned after the International Joint Commission, a U.S.-Canadian agency that has been dealing with border water problems since 1909. If the proposed new agency couldn't settle a problem, the petitioner could still seek redress through existing trade remedy laws, Mr. Trezise said.

Paul Wonnacott, professor of economics at the University of Maryland, also proposed a relaxation for Canada of the level at which subsidized goods become subject to countervailing duty. Countervailing duty now isn't applied if the foreign subsidy is less than 0.5% of the product's value.

U.S. and Canadian negotiators say they are progressing in the trade negotiations, but they decline to disclose details. Their aim is to complete the negotiations by October so that the U.S. Congress can consider and ratify an accord by Jan. 3.

The proposed arrangement would involve eventual elimination of tariffs between the two countries, which last year carried on $125 billion (U.S.) of trade. Mr. Mulroney said Canadian negotiators have been instructed to ensure that the removal of tariffs takes place gradually.

The trade agreement isn't expected to include agriculture. The countries intend to try to reduce obstacles to agriculture trade within a multination framework.

APPENDIX II

Responses to Additional Committee Questions From the March 13, 1987, Hearing

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From: Sen. Ford

POST HEARING QUESTIONS FOR DOE

Miliatry Cost Allocation

Please supply for the record the exact amount of enrichment services (measured in separative work units (SWUs)) provided to the military between 1969 and 1987.

Please provide the amount of revenues received from the military, by year from 1969 through 1987, for enrichment services provided between those years.

-Is this an accurate reflection of the costs of providing that service?

Uranium Industry Viability

Please provide for the record a study on the national interest in maintaining a minimum domestic uranium supply capability. What do you thnk that the minimum level of supply should be? Why?

TVA Issues

Please supply a copy of the TVA contract for the record.

Do you believe that the terms of the TVA contract are ambiguous? Do you believe that TVA is living up to the terms of the contract?

South African Issues

What is DOE's total enrichment capacity? How much of this capacity was utilized in 1985? How much was utilized in 1986? In 1987?

Of the utilized enrichment capacity, what percentage is derived from South African uranium?

How much of the South African uranium will be used domestically, and how much will be immediately transported out of the country after enrichment and fabrication?

From: Sen. Bingaman

QUESTIONS FOR MR. ROSSIN
March 13, 1987

Mr. Rossin, please supply for the record all analyses which DOE has concerning excess foreign enrichment capacity through the year 2000, as well as uncommitted U.S. and foreign demand for enrichment through the year 2000. I would like as much detail as possible, and if you do not have the information today, could you please get it to us by noon on Thursday, so we can have it before us for the Friday hearing?

Would you also supply for us a list of those utilities relying on foreign sources enrichment supply, including whether that reliance is in the form of spot market purchases or long-term contracts, and the country supplying the enrichment? Again, if you do not have this information today, would you supply it by noon on Thursday?

I understand that DOE takes the position that it cannot limit enrichment of foreign source uranium, because to do so will raise its price and cause it to lose business. It is my understanding that the old Atomic Energy Commission testified that it had power to impose a domestic content requirement on enrichment services and uranium by order, regulation, or license condition to carry out the uranium viability provision or to protect its enrichment enterprise. Although DOE now lacks licensing authority, it knows how to issue orders and regulations. Has DOE considered this course, and if not, why not? If you have any legal analyses on the issue, please supply such analyses for the record. Again, I would like to see the material by noon on Thursday.

(DOMENICI)

QUESTIONS TO DOE - 3/13/87 HEARING

1. What are the incremental costs (in $/SWU) associated with DOE payments of "demand charges" to TVA for power not used? Could you elaborate on your reasons for justifying a reduction in these demand charges? Have you received a response from TVA yet?

2. What is the status of negotiations between DOE and the American Enrichment Company (AEC), concerning AEC's interest in operation of the Gaseous Centrifuge Enrichment Plant (GCEP) facilities in Portsmouth? I understand that the White House and OMB are pushing this AEC proposal, but that DOE is concerned that the AEC arrangement amounts to a "giveaway" of federal assets. How much have we invested in the GCEP facilities? Would AEC pay for these sunk costs? Is this type of arrangement similar to what a foreign competitor--say, France or England--would do to bring new interest and investment in new enrichment technology? Would AEC be a competitor to DOE? Would that be like shooting yourselves in the foot?

3. What is the status of URENCO's efforts to establish private enrichment facilities in the U.S.?

4. Is anyone interested in taking over DOE's diffusion plants as a private enterprise? Why?

5. While some of your recent program and policy changes have definitely helped to bring your enrichment costs down to a price more competitive with foreign prices, doesn't your long-term ability to remain competitive depend on development of AVLIS or some other advanced technology? Then how can you justify zeroing of your AVLIS program in the FY88 budget request?

6. What types of technology are our foreign competitors developing for replacement and/or additions to their current enrichment capacity? How is the research on advanced technologies being funded in these countries? Is it included in their SWU costs, or is it funded by the government under a separate R&D account?

7. What would the incremental cost be to Defense Programs (in $/SWU), if the civilian portion of DOE's enrichment business was terminated due to loss of market?

8. Why did you not charge Defense Programs for their SWU's prior to 1978? Why do you now charge less for Defense Programs enrichment services than you do for civilian? How much less? How did you "account" for the "free SWU's" prior to 1978? Did any of these Defense Programs services get subsidized in

any way (directly or indirectly) by the civilian customers? Can you prove this?

9. You have extricated all excess fat from your enrichment business (shutdown of Oak Ridge diffusion plant, reduction in electricity costs, termination of GCEP and AVLIS), except for two things: (1) the resolution of the enrichment debt issue and (2) reduction of TVA demand charges.

   a) If these two issues could be resolved in your favor, would your SWU costs then be competitive with foreign countries?

   b) Would "privitization" of the enrichment business do anything, in and of itself, to make the debt and TVA issues go away?

10. Part of the $3.4 billion "debt" (or "unrecovered costs") that OMB says utilities owe to the enrichment services account is the capital cost of the facilities at Paducah and Portsmouth. If utilities were to pay off this "debt", would they have then, in effect, purchased these plants from DOE? Is that your intent--a kind of back-handed "privatization" scheme? (I am being facetious, but do you see how ludicrous this debt accounting is?)

11. DOE has zeroed funding in its FY88 budget for the advanced enrichment program known as AVLIS (atomic vapor laser isotope separation).

   a) How much of the FY87 funding for AVLIS would have to be diverted for termination costs, assuming Congress does not restore funding in FY88? At what point in time would these termination activities have to begin this year? Where would the largest employment dislocation occur?

   b) What are foreign countries doing with respect to development of AVLIS or other advanced enrichment programs? Within what time frame will these new technologies be brought into commercial operation?

   c) What are the cost savings (in terms of $/SWU) predicted for AVLIS, as compared to our diffusion plants?

   d) If the U.S. does not develop AVLIS in a reasonable time period, is there any way our diffusion plants can remain competitive with foreign enrichment services, should foreign countries proceed with AVLIS development?

12. a) As I understand it, a significant portion of your enrichment business involves contracts to enrich uranium for foreign utilities, primarily utilities in Japan,

Korea, and other Pacific Rim countries. What proportion of your business does this represent?

b) Our domestic utilities do not buy any uranium from South Africa. However, there is a significant amount of South African uranium which our Pacific Rim customers have committed to buy under contract, and this uranium is then enriched at our DOE facilities for shipment to these foreign utilities. Now, these foreign countries have no control over our anti-apartheid policies, but nevertheless, if our policies interfere with their ability to deliver uranium to our DOE facilities for enrichment, wouldn't that force these foreign customers to go elsewhere for their enrichment services?

c) If we lost these foreign customers, could that reduce our enrichment business enough to force shutdown of one of our two currently-operating enrichment plants? Which plant would likely be shut down first?

d) If we lost these foreign customers, would that cause the SWU costs to go up for our domestic customers, in order to absorb the "fixed costs" within a smaller customer base? Would these increased costs then drive our own domestic utility customers abroad to seek cheaper enrichment services? Could we then be faced with a total wipe-out of our enrichment business (other than defense needs)?

13. When I visited with the White House chief of staff Don Regan and OMB director Jim Miller last summer, and told them about the condition of the uranium mining industry, and the very fragile condition of the DOE enrichment business, they were surprised, shocked, concerned, and appalled. Now I ask you, with all of this Administration's posturing as pro-nuclear advocates, and with all their concern over our nation's defense capabilities, why wasn't it DOE instead of me who carried this message to the White House? And why wasn't this message delivered to them by DOE much earlier on, so we could collectively resolve this problem before it got too late? I have to admit that I was shocked and appalled when I realized how uninformed the White House was about this very serious matter. Will I have to be the message-carrier to Howard Baker this time around, or will DOE get its act together for a change?

ADDITIONAL QUESTIONS TO DOE - 3/13/87 HEARING

(SENATOR DOMENICI)

1. Your approach to the uranium enrichment business appears to be the same approach as you're taking toward maintaining the viability of the domestic mining industry. The Administration is neglecting both of them into oblivion. Wouldn't it make more sense to introduce comprehensive legislation that can act to retain both of these industries in the United States rather than gradually letting them evaporate so that the country has to rely on foreign sources of supply?

2. During your testimony last year you seemed to be very favorably disposed toward restructuring the business into a Government corporation. Despite this, you still haven't presented your recommendations to Congress. Have you changed your mind on the Government corporation?

   Are you thinking in terms of some sort of Comsat/Conrail type of arrangement? Would you take a copy of the plan I proposed ← (ATTACHED) last year in a draft of S. 1004, and comment on it for me? I think that you and I may be thinking along the same lines.

3. The debt issue still looms over the uranium enrichment enterprise in a way that threatens its very existance. Is OMB still insisting that the enterprise pay $3.4 billion plus interest over the next 20 years to Treasury? Can you do this and price competitively?

4. Did you tell your utility customers that they had $3.4 billion debt to repay over the next 20 years when they signed the Utility Services contract in 1984?

5. Isn't the debt just a measure of how much you want to get out of the business as you harvest it and turn it over to the private sector?

6. If, however, your actions cause you to lose all of your contracts and customer base, doesn't that reduce to zero the value of the business? In other words, if you don't have any customers to buy your produce, how does the business have any value at all?

7. Understanding that the Administration is not very quick or forthright in proposing a solution to problems that you admit that you have, would you be willing to commit to responding to legislation that this committee might introduce to fix the problems of the uranium enrichment and uranium mining industries?

Enrichment Service Corporation

PURPOSES:

- Provide uranium enrichment production and market services in domestic and foreign market.
- Support the existing contracts of commercial customers including government.
- Conduct research, development, and testing on advance technologies for enrichment service.
- Perform the forgoing matters efficiently, economically, and safely with the goal of eventual commercialization.

ORGANIZATION:

- The government/private ownership corporation is to be directed by a board of five directors. Initially, three directors are to be appointed by the President with the confirmation by the Senate, and two directors elected by the owners of the corporations' preferred stock for staggered 5-year term.
- Except the Chairman, all directors are on part-time basis.
- The Board shall appoint a Chief Operating Officer and other officers as appropriate.
- Each elected director shall represent at least $10 million of preferred stocks.
- All title of equity shall remain with the government.
- Within six months after the appointment of the Board, the Board shall submit a business plan to the Congress which shall be affirmed after 45 days while Congress is in session, unless otherwise rejected by the Congress.

FINANCING:

- The corporation shall issue preferred stocks for sale to the public.
- The corporation may obtain funds from the commercial market by loan or by sale of the corporations' securities.
- ~~The corporation is eligible to receive appropriation from Congress~~.

- The corporation may even tually offer for sale common stocks in exchange of equity, such proceeds shall return to the Treasury.

CONTRACTING & PRICING AUTHORITY:

- The corporation may enter into long-term contracts to procure and supply goods and services.
- Contract prices shall be established sufficient to provide for all of the Corporations' financial obligations which may include a return of investment.
- Prices shall be established on a competitive non-discriminatory basis for domestic customers; prices for foreign customers may differ in consistency with applicable law and the objectives of the United States.
- Provisions shall permit price adjustments on a prospective basis.
- The corporation is to manage existing contracts and to actively seek new contracts for enrichment services.
- The corporation is deemed a Federal Agency.

ENRICHMENT SERVICE:

- Establish the requirements for enrichment of uranium in Federally owned GDP and provide oversight for management and inventory policy.
- Manage the uranium facility expansion program and arrange for the operating of such facilities including GCEP or other advance techniques.
- Conduct R&D and testing for uranium enrichment for commercial purposes.

REPORTS:

- The corporation shall report to the President and Congress at least once a year.
- The corporation shall publish an annual report in consistency with general accepted accounting practices.
- When privatization is feasible, the Board shall recommend the necessary legislation to the President and Congress.

7/17/86

Title IV
Uranium Enrichment Reorganization and Commercialization

Declaration of Policy

Sec. 401. (a). Statement of Policy - The Congress declares that there is a need to establish a government and private ownership corporation with the intent of eventual commercialization for uranium enrichment to

(1) Assure the continued reliable supply of enrichment services with competitive pricing;

(2) Carry out the responsibility with respect to uranium enrichment for government and commercial use;

(3) Provides public with fair compensation for natural resources and facility usage.

(4) Stimulate and assist in development of a private enterprise uranium enrichment management capability;

(5) Protect public health and safety and the environment with respect to the Corporations' activities;

(6) Provide a stable long-term strategy for the uranium enrichment with minimal political and institutional interventions;

(7) Advance U.S. non-proliferation objectives, including confirmation of the reliability of the United States as a supplier of materials and services.

(b) Purposes - It is therefore declared to be the purpose of Congress in this Act to establish a Government and private ownership corporation to

(1) act as agent for the Government in reference to domestic and foreign sale of seperative work units;

(2) serve as managing agent in establishing operational requirement for enrichment of uranium for government and commercial purposes in existing gaseous diffusion enrichment and related facilities;

(3) contract with the Government to obtain rights to associated feed material and appropriate stockpiles of enriched uranium sufficient to permit the efficient, economic performance of all existing and future enrichment contracts for government and commercial purposes with domestic and foreign customers and suppliers;

(4) construct, purchase, lease, license, or otherwise provide for facilities using conventional or advanced technologies to provide uranium enrichment services for government and commercial purposes, including centrifuge enrichment and advanced isotope separation;

(5) operate such facilities in support of contracts for furnishing enrichment and related nuclear fuel supply services to domestic and foreign customers;

(6) conduct research, development and testing on advanced techniquesfor enrichment services for commercial use.

Establishment

Sec. 402. (a). There is established in accordance with the provisions of this section, a Government and private ownership uranium enrichment services corporation to be known as the "Enrichment Services Corporation" (in this Act referred to as the "Corporation").

(b) The Secretary of the Department of Energy shall be deemed as the incorporator of the Corporation and shall incorporate the Corporation within 180 days of the effective date of this Act, and serve as an acting Chairman of the Board of the Directors for a period of not more than 60 days after the date of incorporation of the Corporation.

(c) Except as otherwise provided in the bill, the Corporation shall be incorporated under, and be subject to the provisions of, the District of Columbia Business Corporation Act as amended from time to time. The headquarters of the Corporation shall reside in the District of Columbia, however, the Corporation may establish offices elsewhere in the United States as determined by the Board of Directors of the Corporation. The Corporation is deemed to be a resident of the District of Columbia.

(d) There are hereby transferred to the Corporation all uranium enrichment functions of the Secretary of Energy.

Board of Directors

Sec. 403. (a)(1) The powers of the Coporation shall be vested in the Board of Directors, except those functions, powers, and duties vested in the Chairman by or pursuant to this Act.

(2) The Board of Directors shall consist of five directors:

(A) The Chairman and two other directors shall be appointed by the President, by and with the advice and consent of the Senate within 60 days after the incorporation.

(B) Two non-government directors shall be elected by the owners of the Corporation preferred stock after the sale of at least $100 million of the gross sales price of preferred stock;

(C) No member of the Board may have any employment or other direct financial relationship with the Corporation;

(D) Except the Chairman, all directors are on part-time basis.

(b) Terms of Office - The terms of office of the Chairman shall be 5 years. The terms of office of the other two directors appointed by the President shall be designed at the time of appointment to be at the end of second and third year. The terms of non-government directors shall be at the end of the fourth and fifth year. Successors to members of such Board shall be appointed or elected in the same manner as the original members but with 5 year terms and these directors may succeed themselves.

(c) Before assuming office, each Director shall take an oath faithfully to discharge the duties thereof. All Directors shall be citizens of the United States.

(d) The Board of Directors shall meet at any time pursuant to the call of the Chairman and as may be provided by the bylaws of the Corporation, but not less than quarterly. A majority of the Board of Directors shall constitute a quorum, and any action by the Board of Directors shall be affected by majority vote of all members of the Board of Directors. The Board of Directors shall adopt necessary or appropriate, and may from time to time amend, such bylaws as are necessary for the proper management and functioning of the Corporation.

Officers and Employees

Sec. 404. (a) The Board shall appoint a chief executive officer of the Corporation, who shall act upon the majority of votes of the Board on major issues and shall be responsible for the management of the Corporation.

(b) The Board of Directors shall--

(1) establish the offices and appoint the officers of the Corporation (including a General Counsel and Treasurer) and define their duties;

(2) fix the compensation of individual officer positions and categories of other employees of the Corporation in consistence with compensations for comparable corporations.

(3) provide a system of organization to fix responsibility and promote efficiency.

(4) provide an initial business plan within 90 days after appointment, and annual business plan thereafter in the annual report.

(c) Except as specifically provided in this Act, Directors, officers, and employees of the Corporation shall not be deemed as Federal employees.

(d) No political test or qualification shall be used in selecting, appointing, promoting, or taking other personnel actions with respect to officers, agents, and employees of the Corporation.

(e) The Chief Executive Officer shall appoint and terminate such employees as may be necessary for the transaction of the Corporation's business. The Board shall make appropriate provision for career protection of officers and employees of the Corporation and for a pension system applicable to the Chairman and officers and employees of the Corporation, except that any individual already covered by the Federal Civil Service retirement system at the commencement of his service with the Corporation may elect to remain within the coverage of such system in lieu of coming with the Corporation's pension system.

General Powers and Duties

Sec. 405. (a) In carrying out the provisions of this Act, the Corporation shall have the power, consistent with the provisions of this Act to:

(1) adopt, alter, and rescind bylaws and adopt and alter a corporate seal, which shall be judicially noticed;

(2) enter into contracts with persons licensed under section 53, 63, 103 or 104 or as otherwise authorized by law for such periods of time as the Corporation may deem necessary or desirable to provide for enriching uranium by the Corporation; and enter into contracts to provide for enriching uranium by the Corporation in accordance with and within the period of an agreement for cooperation arranged pursuant to section 123 of the Atomic Energy Act of 1954 as amended or as otherwise authorized by law.

(3) acquire and hold such real and personal property as it deems necessary or appropriate in the exercise of its responsibility under this Act.

(4) sue and be sued, in its Corporate name and to complain and defend in any court of competent jurisdiction;

(5) enter into long-term contracts to procure any supply, services, and property.

(6) subject to section 404, select, employ, and fix the compensation (including, without limitation, pension plans, health benefits, incentive compensation plans,

paid vacation, sick leave, and other fringe benefits) of such officers, employees, attorneys, and agents as shall be necessary for the transaction of the business of the Corporation;

(7) make provision for and designate such committees, and the functions thereof, as the Board of Directors may deem necessary or desirable;

(8) indemnify and provide insurance for Directors and officers of the Corporation, as the Board of Directors may deem necessary or desirable;

(9) determine and prescribe the manner in which obligations of the Corporation shall be incurred and its expenses allowed an paid;

(10) obtain the services and fix the compensation of experts and other personnel in consistence with market rates. (11) to use the United States mails on the same terms and conditions as the executive departments of the United States Governments; and

(12) exercise all other lawful powers necessarily or reasonably related to the establishment of the Corporation, carry out the provisions of this Act and the exercise of its powers, purposes, functions, duties, and authorized activities.

(13) have such power as may be necessary or appropriate for the exercise of the powers herein specifically conferred upon the Corporation and all such powers as are customarily in corporations including but not limiting mortgage, pledge encumber, coverture and participate with respect to its property and revenues.

(14) receive the unexpended balance of appropriations of the Department, other moneys available to the Department, and accounts receivable which relate to functions, and activities acquired by the Corporation from the Department pursuant to this title.

(b) Duties - In addition to its duties and responsibilities under other provisions of this Act, the Corporation shall--

(1) assume contracts between the Department of Energy and persons obligating such persons to enrich uranium in Federally owned GDP and provide oversight for management and inventory policy;

(2) conduct the uranium enrichment facility expansion program and arrange for the operating of such facilities including GCEP or other advance techniques;

(3) conduct research and development and testing activities relating to uranium enrichment as the Corporation deems necessary or advisable.

(4) enrich uranium for the Department of Energy on a commercial basis in such amounts as requested and reimbursed by the Department of Energy.

(5) Make available to the President, and appropriate Committees of the Congress all studies, data and other information acquired or developed by the Corporation except confidential or security related information as dictated by this and other appropriate laws.

(c) Investment of Funds. Uncommitted funds of the Corporation shall be kept in cash on hand or on deposit, or invested in obligations of the United States or guaranteed thereby, or in obligations, participations, or other investments which are lawful investments for fiduciary, trust, or public funds.

(d) Exemption from Taxation. The Corporation including its capital reserves, surplus, security holdings, and income shall be exempt from all taxation now or hereafter imposed by the United States, any commonwealth, territory, dependency, or possession thereof, or by any State or political subdivision thereof, except that any real property of the Corporation shall be subject to taxation to the same extent according to its value as other real property is taxed.

(e) Annual Report. The Corporation shall transmit to the Congress and the President, not later than 90 days after the end of each fiscal year, a comprehensive and detailed report on all activities of the Corporation during the preceding fiscal year. Each such report shall include (1) the Corporation's statement of specific and detailed objectives for the activities and programs conducted and assisted under this Act; (2) statements of the Corporation's conclusion as to the effectiveness of such activities and programs in meeting the stated objectives and the purposes of this Act; (3) recommendations with respect to any legislation or administrative action which the Corporation deems necessary or desirable; (4) a statistical compilaton of the obligations issued under this Act; (5) a summary of outstanding problems confronting the Corporation, in order of priority; (6) all other information required to be submitted to the Congress pursuant to any other provision of this Act; and (7) the Corporation's projections and plans for its activities and programs during the next three fiscal years.

(f) Budget - The receipts and disbursements of the Corporation in the discharge of its functions shall not be included in the totals of the budget of the United States Government, and shall be exempt from any annual expenditure and net borrowing (budget outlays) limitations imposed on a budget of the United States Government. The Chairman of the Corporation shall transmit annually to the Congress a budget for program activities and for administrative expenses of the Corporation. The Chairman shall report annually to the Congress the amount of net borrowing of the Corporation, which would be included in the totals of the budgets of the United States Government, if the Corporation's activities were not excluded from those totals as a result of this section.

Patents

Sec. 406. (a) The title to the patent of any invention made or conceived in the course of conducting research and development by the Corporation or under contract with the Corporation shall vest in the Corporation. The Corporation shall have the right to license the patent on a nonexclusive basis.

(b)(1) The Corporation may grand a nonexclusive license for the use of any invention for which it holds the patent but it may not grant an exclusive or partially exclusive license except as provided in paragraph (2).

> (2) The Corporation is authorized to grant an exclusive or partially exclusive license for the use of any invention for which it holds the patent to a responsible applicant or applicants, upon terms reasonable under the circumstances, on the basis of competitive bids and following an opportunity for a hearing, upon notice in the Federal Register thereof to the public, only when, in the judgment of the Board of Directors, such exclusive or partially exclusive license is necessary to assure substantial utilization of such invention within a reasonable time.

(c) Each exclusive or partially exclusive license for the use of an invention granted under subsection (b) shall contain such terms and conditions as the Corporation may determine to be appropriate for the protection of the interests of the United States and the general public, including provision for the Corporation, commencing two years after the grant of a license pursuant to subsection (b), to terminate such license if (1) it has not been applied to the commercialization of domestic energy resources or (2) steps have not been taken as necessary to assure substantial utilization of such invention within a reasonable time.

(d) The United States Government shall have a royalty-free, nonexclusive license to any invention in which the Corporation owns title or reserves a license pursuant to subsection (a). The Corporation may assign title to any invention in which it has the title to the United States Government.

Obligations Authority

Sec. 407. (a) General. To carry out the purposes of this Act, the Corporation is authorized to issue bonds, debentures, trust certificates, securities, or other obligations and to engage in other financing techniques or provide for profit sharing or other participation mechanisms or structures (herein cited as "obligations") in accordance with this section. Such obligations shall have such maturities and bear such rate or rates of interest as are determined by the Corporation with the approval of the Secretary of the Treasury. Such obligations shall be redeemable at the option of the Corporation prior to maturity in the manner stipulated in each such obligation, and may be purchased by the Corporation in the open market at a price which is reasonable.

(a) Any person may purchase preferred stock of the Corporation, and may hold or dispose of such stock, except that no foreign person may hold a greater percent of the outstanding stock than is permissible under the Atomic Energy Act of 1954 as amended.

(b) Maximum Obligational Authority. Except as otherwise provided in the last sentence of this subsection, the aggregate amount of obligations of the Corporation issued under this section which may be outstanding at any one time shall not exceed $3,500,000,000.

(c) Validity. No obligation issued by the Corporation under this section shall be terminated, canceled, or otherwise revoked, except in accordance with lawful terms and conditions prescribed by the Corporation. Such an obligation shall be conclusive evidence that it is in compliance with this section, has been approved, and is legal as to principal, interest, and other terms. An obligation of the Corporation shall be valid and incontestable in the hands of a holder, except as to fraud, duress, mutual mistake of fact, or material misrepresentation by or involving such holder.

(e) The Secretary of the Treasury. If at any time the moneys available to the Corporation are insufficient to discharge its responsibilities, the Corporation shall issue notes or other obligations to the Secretary of the Treasury. Such obligations shall bear interest at a rate to be determined by the Secretary of the Treasury taking into consideration the current average market yield on outstanding marketable obligations of the United States of comparable maturities during the month preceding the issuance of such obligations. The Secretary of the Treasury is authorized and directed to purchase any such obligations and for such purpose is authorized to use as a public debt transaction the proceeds from the sale of any securities issued under the Second Liberty Bond Act, as amended. The purposes for which securities may be issued under such Act are extended to include any purchase or notes or other obligations issued under this subsection. At any time, the Secretary of the Treasury may sell any such obligations, and all sales, purchases, and redemptions of such obligations by the Secretary of the Treasury shall be treated as public debt transactions of the United States.

(f) Lawful Investments. All obligations issued by the Corporation shall be lawful investments and may be accepted as security for all fiduciary, trust, and public funds, the investment or deposit of which shall be under the authority and control of the United States or any officer or officers thereof. All such obligations issued pursuant to this section shall be exempt securities within the meaning of laws administered by the Securities and Exchange Commission.

Repayment of Prior Costs and Pricing

Sec. 408. (a) Title to existing gaseous diffusion enrichment facilities will remain in the Government.

(1) The Corporation shall be required to compensate fairly and reasonably the United States for any property sold to the Corporation by the United States.

(2) Section 161(v) of the Atomic Energy Act of 1956 as amended is hereby amended by deleting the words "any prices established under this subsection shall be on a basis of recovery of the Government's costs over a reasonable period of time," and insert in lieu thereof with "any price established under this subsection shall be solely determined by the Uranium Enrichment Corporation only. The prior unrecovered Government costs to be paid for by the commercial customers shall be $350,000,000. The said amount shall repay fully and completely any and all obligation borne by the commercial customers for costs incurred by the uranium enrichment program prior to FY 1986."

(b)(1) The Corporation shall establish prices for products, materials and services that the Corporation contracts to supply to domestic and foreign customers for enrichment and such other related activities as the Corporation may undertake. Such prices shall be established sufficient to provide for all the Corporation's estimated operation and maintenance costs, including but not limited to the cost of contracted services, research and development, interest payments, payments to the Treasury as specified in sec. 409 (b), appropriate reserve accounts, payment in lieu of taxes and other necessary costs within the review of the bill, plus a return on the investment of the holders of the preferred stock of the Corporation as determined by the Board.

(2) The prices shall reflect the objective of this Act to stimulate and assist in the development of a private uranium enrichment enterprise and that prices for foreign users can reflect an appropriate surcharge or reduction as determined by the Corporation, consistent with the policy objectives of the United States and applicable law.

(3) The Corporation shall provide for periodic publication of the Corporation's prices, which will be the base prices for contracts entered into during a particular period. There will be provision for

readjustment and recalculation of the prices at the time services are performed, or otherwise.

Enrichment

Sec. 409. (a) The Corporation shall be authorized to operate the existing gaseous diffusion enrichment facilities for domestic and foreign commercial purposes, consistent with United States military needs. The Government shall assign its rights and obligations under existing contracts with customers, suppliers, and other entities to the Corporation to permit the Corporation to act as agent for the Government for enrichment services in existing gaseous diffusion facilities for domestic and foreign commercial purposes and to meet the objectives of this Act. The Corporation shall enter into contracts with the Government which shall provide the Corporation with rights of access to and use of appropriate inventories of enriched uranium and feed materials and to other facilities, patents and technical information. The Government shall retain title and control of enriched uranium and feed material needed for all military purposes including a strategic stockpile.

(b) The Corporation shall make annual, reasonable payments, which are to be negotiated by the Corporation with the Secretary of Energy annually, for the rights of access to and use of appropriate uranium enrichment facilities and for the use of feed stocks. Such payments may be determined by users' fees, surcharge of SWUs, or other appropriate means. Government users of the Corporation's goods and services shall be charged comparable rates for such goods and services as commercial users.

(c) The Corporation shall be authorized to construct, to acquire by lease, or to contract the use and management of the Government's centrifuge enrichment and advanced isotope separation facilities.

(d) The Corporation shall act as the domestic and international agent of the United States Government in connection with the sale of separative work units. Sales shall be made at times and at prices deemed acceptable in the sole discretion of the Corporation, subject to the provisions of Sec. 403.

(e) The Corporation shall conduct its activities (including entering into long-term contracts) in a manner so as to assure reliability of fuel supply for civilian nuclear power reactors and other policy objectives, including a secure energy supply for the United States, energy conservation, and an appropriate share for the U.S. of the world uranium enrichment market. The Corporation is authorized to conduct research and development programs, including centrifuge and advanced isotope separation processes for commercial applications. The Corporation may conduct research and development programs in its own facilities, using established Government facilities or private industry, or otherwise. The Corporation shall support U.S. foreign policy goals, including non-proliferation.

(f) The Corporation shall utilize the services of private industry to the maximum extent consistent with fulfillment of its responsibilities. The Corporation shall conduct all its activities so as to foster and encourage, consistent with other statutory objectives, assumption by private enterprise of full responsibility for uranium enrichment as soon as economically justified as specified in Sec. 414.

(g) Contracts entered into by the Corporation shall provide for charges with a schedule of payments that would cover costs of the Corporation and for such advance payments for services as the Corporation deems proper.

(h) The Corporation shall conduct a program of safeguards development and training related to facilities it owns or operates.

NUCLEAR INDEMNIFICATION

Sec. 410. The Atomic Energy Act of 1954 as amended, is amended as follows:

(a) Subsection 11(s) is amended by substituting a comma for the period at the end thereof and adding the following: "including the Uranium Enrichment Corporation."

(b) The first sentence of subsection 170(d) is amended to read: "In addition to any other authority the Commission may have, the Commission is authorized until August 1, 1987, to enter into agreements of indemnification with is contractors and contractors of the Uranium Enrichment Corporation for the construction or operation of production or utilization facilities or other activities under contracts for the benefit of the United States involving activities under the risk of public liability for a substantial nuclear incident."

(c) The second sentence of subsection 170(d) is amended by substituting for the opening phrase: "In such agreements of indemnification, the Commission may require its contractor . . ." the following phrase: "In such agreements of indemnification the Commission may require the contractor . . ." at the commencement thereof.

SAFETY AND LICENSING

Sec. 411. (a) The Corporation shall receive existing Department of Energy authority in that its contractors are hereby exempted from the licensing requirements and prohibitions of sections 57, 62, 81, 101 or other provisions of the Atomic Energy Act of 1954 as amended to the same extent as the Department of Energy and its contractors are exempt in regard to the Department's own functions and activities.

(b) Subject to subsection (a) of this section, the Corporation shall not transfer or deliver any source, special facilities to any person who is not properly qualified or licensed under the provisions of the Atomic Energy Act of 1954 as amended.

(c) The Corporation shall be subject to the Department of Transportation's regulation in transfer and deliver any source, special nuclear or by product materials to the same extent as the Department of Energy and its contractors.

Foreign Customers and International Relations

Sec. 412. (a) In its dealings with foreign customers, the Corporation shall, to the extent consistent with the Treaty on the Non-Proliferation of Nuclear Weapons, the Nuclear Non-Proliferation Act of 1978 and other federal law, apply a policy of furnishing goods and services with the maximum attainable reliability.

(b) The Corporation's facilities shall be subject to safeguards requirements of the Federal Governement. The Corporation shall be consulted fully and in advance whenever a proposed Agreement for the Corporation or subsequent arrangement might affect its operation. The Corporation shall cooperate fully with the IAEA and others in performing research, development and training on safeguards.

(c) In the event an International Nuclear Fuel Authority (INFA) is established pursuant to Section 104 of the Nuclear Non-Proliferation Act of 1978, the Corporation shall, as directed by the President and subject to any prior contractual obligations, cooperate fully in the operations of INFA.

Miscellaneous Provisions

Sec. 413. (a) The Corporation shall be deemed an instrumentality of the United States Government, except to the extent otherwise provided in the Act.

(b) The Comptroller General shall audit the Corporation's activities.

(c) The Corporation may self-insure or procure insurance to cover liability or property damage other than specified in Sec. 410.

(d) The Corporation shall carry out the classification and information control policy of the Government.

(e) The Corporation shall not be subject to the provisions of the Public Utility Holding Company Act of 1935, nor shall any company become subject to the provisions of that Act by virtue of ownership of stock of the Corporation.

(f) The Corporation shall be exempt from the antitrust laws. The Corporation's owners shall be exempt from the anti-trust laws to the extent necessary to fulfill the purposes of this Act.

(g) The Corporation and the Department of Energy shall share the costs of decontamination and/or decommissioning of the facilities and equipment based on the ratio of the separative work produced under the ownership of each party.

Transition to Private Ownership

Sec. 414. (a) When commercialization of any or all of the enrichment enterprises is deemed feasible by the Board of Directors, the Board shall submit to the President and the Congress a plan for the transfer of any or all of the functions of the Corporation to a commercial private non-government entity or entities.

(b) The transfer plan submitted pursuant to subsection (a) shall take effect by legislative approval.

(c) The Corporation established under Sec. 401 of this Act shall terminate upon the transfer of all the functions of the Corporation as provided in subsection (a).

(TO DOE) - FROM DOMENICI

URANIUM OVERFEEDING

The Congress approved certain criteria for the operation of the DOE enrichment business in last year's CR. One of the DOE operational practices that we specifically disapproved was a process which involves the use of stockpile uranium. In the past the DOE has considered using some of its stockpile to feed enrichment plants rather than just use the uranium supplied by the utilities. This lets the DOE save money because it is using less electricity to enrich more uranium rather than more electricity to enrich a smaller amount of uranium. It is my understanding that you have testified before the House Energy and Commerce Committee that the Department intends to undertake this practice in the coming year.

1. Are you presently operating in this manner?

2. Do you plan to operate in this manner in the future?

3. What is the legal basis for this operation in light of the action of the last Congress?

Department of Energy
Washington, DC 20585

May 1, 1987

Honorable Wendell H. Ford
Chairman
Subcommittee on Energy Research and
 Development
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

On March 13, 1987, A. David Rossin, Assistant Secretary for Nuclear Energy appeared before the Subcommittee on Energy Research and Development of the Committee on Energy and Natural Resources to discuss the domestic uranium mining industry and the uranium enrichment program. Mr. Rossin was accompanied by John Longenecker, Deputy Assistant Secretary for Uranium Enrichment.

Following the hearing, you submitted written questions for our response to supplement the record. Enclosed are the answers to those questions, which also have been sent directly to the Committee staff.

If you have any questions, please have your staff call Mike Gilmore or Tom Todd on 586-4277. They will be happy to assist you.

Sincerely,

Thomas Todd
for Robert G. Rabben
Assistant General Counsel
  for Legislation

Enclosures

POST-HEARING QUESTIONS AND ANSWERS
RELATING TO THE
MARCH 13, 1987 HEARING
BEFORE THE
SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

WITNESS: A. DAVID ROSSIN

ASSISTANT SECRETARY FOR NUCLEAR ENERGY

U.S. DEPARTMENT OF ENERGY

QUESTIONS FROM SENATOR FORD

Military Cost Allocation

Question 1: Please supply for the record the exact amount of enrichment services (measured in separative work units (SWUs)) provided to the military between 1969 and 1987.

Answer: Requirements for Government Programmatic Activities*

FY	Thousands of SWU**
1969	2,580
1970	2,416
1971	1,845
1972	253
1973	521
1974	346
1975	606
1976	927
1977	1,652
1978	1,332
1979	909
1980	845
1981	1,379
1982	1,538
1983	1,281
1984	1,710
1985	1,447
1986	1,820
1987	1,777 (current estimate)

*Requirements are principally for national security purposes.
**Measured at a 0.20 percent U-235 tails assay.

QUESTIONS FROM SENATOR FORD

Military Cost Allocation

Question 2: Please provide the amount of revenues received from the military, by year from 1969 through 1987, for enrichment services provided between those years. Is this an accurate reflection of the costs of providing that service?

Answer: From 1969 through 1982 Government users did not provide revenues for the enrichment services they received. The enrichment program received budget authority to cover all the costs. Beginning in FY 1983 Government users were charged for the budget costs of providing enrichment services. Their price did not include components for depreciation and imputed interest that are included in charges to commercial customers. However, it is important to note that accounting adjustments were made so that these costs were not charged to commercial customers.

The following table shows the revenues received from Government users of enrichment services.

Year	Revenues (in Millions)
1969-1982	0*
1983	109.0
1984	139.9
1985	142.8
1986	169.6
1987	176.9 (current estimate)

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*Accounting adjustments were made so that these costs were not charged to commercial customers.

Answer 2 (continued): A change was made in FY 1986 to develop separate prices for high assay enrichment. The Department established a new accounting system in that year to record the actual cost of high assay enrichment. This change was necessary as increasing safety and security costs were resulting in significantly higher costs for high assay enrichment.

QUESTIONS FROM SENATOR FORD

Uranium Industry Viability

Question 3: Please provide for the record a study on the national interest in maintaining a minimum domestic uranium supply capability. What do you think that the minimum level of supply should be? Why?

Answer: Based on preliminary information, the U.S. uranium concentrate production in 1986 totaled about 13 million pounds of U308, an increase of about 15 percent over the 1985 production. The 1986 concentrate production amounted to about 46 percent of the natural uranium delivered to the DOE gaseous diffusion plants by domestic enrichment services customers. Thus, there is a sizable U.S. mining and milling capacity, the existence of which is important to the national security, energy independence, and employment of the United States.

We have no information on what the minimum domestic uranium supply level should be. The Energy Information Administration annually reports data on the industry and the Secretary makes an annual determination as to the viability of the industry. In making this determination, a number of criteria have been established--one of which is the supply response capability. However, the Department has not established a minimum level of supply to determine viability as there are other factors used in making the determination.

QUESTIONS FROM SENATOR FORD

TVA Issues

Question 4:	Please supply a copy of the TVA contract for the record.
Answer:	Copies of the DOE/TVA contracts for the Paducah and Oak Ridge gaseous diffusion plants follow.

Copies of the DOE/TVA power contracts
are on file with the Subcommittee
on Energy Research and Development

QUESTIONS FROM SENATOR FORD

TVA Issues

Question 5: Do you believe that the terms of the TVA contract are ambiguous? Do you believe that TVA is living up to the terms of the contract?

Answer: The contracts are certainly extremely general in their description of the rates which may be charged. They state only that these charges should be "based on TVA's prevailing General Power Rate--Schedule C-2 (July 31, 1967) which may be modified or replaced by TVA from time to time."

We do not believe that TVA is living up to the terms of the contract. The rate structure and revenue requirements at the time DOE and TVA entered into the subject contracts were almost totally associated with TVA's in-service generating capacity. It has only been since the late 1970's that TVA has begun to include costs associated with cancelled plants and plants in construction in the revenue requirements to be recovered totally through the demand charge. This is, in effect, a unilateral change by TVA in the agreement that was originally entered into between DOE and TVA.

Additionally, TVA has set rates that will bill DOE for a significant portion of the costs associated with TVA's

Answer 5 (continued): cancelled nuclear plants and for plants that are under construction. Thus, in addition to DOE assuming the risk for 4,485 MW of capacity (plus associated reserves) it contracted for, DOE, through TVA's rate structure, is also paying for TVA's overestimate of the needs of its other customers', as well as for plants that will go into service after DOE leaves the TVA system.

Our recent studies strongly indicate that TVA is charging DOE significantly more than what it would cost TVA to provide DOE the 4,487 MW of contracted capacity. This overcharge is due primarily to costs associated with plants that are unrelated to TVA's obligation to supply power to DOE. In addition, we have concluded that TVA is unjustified in continuing to bill DOE for a capacity charge premium. Such premiums are no longer justified by TVA's prevailing rate structure. Finally, we have concluded that equitable reductions in DOE's capacity charges are possible without near-term rate increases to other TVA customers by pursuing alternative accounting approaches which are consistent with generally-accepted accounting and utility ratemaking techniques and are within TVA's authority to implement.

QUESTIONS FROM SENATOR FORD

South African Issues

Question 6:

What is DOE's total enrichment capacity? How much of this capacity was utilized in 1985? How much was utilized in 1986? In 1987?

Answer:

Currently, the enrichment capacity of the two operating gaseous diffusion plants is 19.2 million SWU per year. Prior to placing the Oak Ridge Gaseous Diffusion Plant in a standby mode in 1985, the enrichment capacity of the three plants was 26.9 million SWU per year.

In FY 1985, 10.447 million SWU were produced, or about 39 percent of the 3-plant enrichment capacity. In FY 1986, 7.852 million SWU were produced, or about 41 percent of the 2-plant enrichment capacity. In FY 1987 we expect to produce about 6.3 million SWU, or about 33 percent of the 2-plant enrichment capacity.

QUESTIONS FROM SENATOR FORD

South African Issues

Question 7: Of the utilized enrichment capacity, what percentage is derived from South African uranium?

Answer: Approximately 30 percent of DOE enrichment sales are associated with enrichment customers, all of which are foreign utilities, that currently supply feed of South African origin uranium.

QUESTIONS FROM SENATOR FORD

South African Issues

Question 8: How much of the South African uranium will be used domestically, and how much will be immediately transported out of the country after enrichment and fabrication?

Answer: Beginning January 1, 1987, no South African origin uranium will be used domestically. All, i.e. 100 percent, of the South African uranium delivered to DOE for enrichment will be immediately transported out of the United States after enrichment and fabrication.

QUESTIONS FROM SENATOR BINGAMAN

Question 9: Please supply for the record all analyses which DOE has concerning excess foreign enrichment capacity through the year 2000, as well as uncommitted U.S. and foreign demand for enrichment through the year 2000.

Answer: Attached is a copy of a draft report prepared by Martin Marietta.

DRAFT

MARKET IMPACTS OF RESTRICTING DOE FROM ENRICHING FOREIGN-ORIGIN URANIUM ORE

In view of the current court case, Western Nuclear, Inc., et al. vs. F. Clark Huffman et al., particularly count I related to the enrichment of foreign-origin feed, it is instructive to examine the potential impact upon the future of DOE's enrichment business of a decision in favor of severely restricting the use of such feed. It is the purpose of this paper to show, using the public statements of DOE's competitors, that they have both the will and the means to capture and hold a significant fraction of DOE's current enrichment business.

BRIEF DESCRIPTION OF DOE's COMPETITORS

DOE is one of four suppliers of SWU to the free world nuclear power utilities. Besides DOE, the suppliers are COGEMA, Urenco and Techsnabexport. COGEMA is a French company which is broadly integrated across the nuclear fuel cycle. It is the major partner in a joint venture operation of a single gaseous diffusion plant, located on the Rhone River at Tricastin, France. Construction of this plant was completed in 1982. It is as large in SWU capacity, at 10,800,000 SWU per annum, as the largest DOE plant at Paducah, Kentucky, and is thoroughly modern. Urenco is a consortium of British, Dutch and West German firms; it uses the gas centrifuge process to enrich uranium. Urenco operates production facilities in all three member nations. The Urenco current total capacity is about 1,850,000 SWU per annum. Techsnabexport is the nuclear fuel cycle marketing arm of the Soviet Union. They have consistently announced the availability of 3,000,000 SWU per year for sale in free world nations.

SUMMARY OF THE WORLD SWU SUPPLY AND DEMAND BALANCE

NUKEM* publishes data on existing customer SWU contracts, by major producer, and SWU requirements for reactors under construction. These data have been combined with our estimates of competitor production capacity to construct a year-by-year comparison between production capacity and demand for the period from 1987 through 1995. This information, presented in Table 1, is based on plans announced through the spring of 1986. It does not reflect any new production initiatives to exploit possible DOE vulnerabilities resulting from the Western Nuclear suit or the possible legislative rejection of DOE's proposed revision of its enrichment services criteria. Table 1 also includes a recent projection of DOE's anticipated domestic sales. The purpose of Table 1 is to show that there is actual plus potential foreign SWU production capacity sufficient to meet a large fraction of the needs of U.S. utilities who are currently customers of the DOE.

It is quite clear from Table 1 that today there is a considerable net excess SWU capacity outside of DOE and that under current business plans, this oversupply will exceed 3,000,000 SWU per annum by 1989. In 1987, according to the table, the net excess capacity will amount to 3,500,000 SWU, a value which is 58% of DOE's anticipated civilian domestic customer 1987 SWU requirements. Under current business plans, the net excess uranium enrichment capacity

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*NUKEM, Inc. is a consulting and engineering firm in the nuclear fuel cycle. It is headquartered at 1 North Broadway, White Plains, New York 10601.

Table 1. Projection of non-U.S. SWU production and demand
(Quantities in millions of SWU)

	1987	1988	1989	1990	1991	1992	1993	1994	1995
EURODIF									
Plant capacity (firm)	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8	10.8
Contracted requirements[a]	8.1	9.0	8.3	7.9	7.0	6.8	7.3	7.6	7.5
Excess Eurodif capacity	2.7	1.8	2.5	2.9	3.8	4.0	3.5	3.2	3.3
URENCO									
Plant capacity (reasonably firm)	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5
Contracted requirements[a]	2.1	2.1	2.5	2.9	3.0	2.9	2.8	2.6	2.4
Excess Urenco capacity	0	0.3	0.2	0.1	0.3	0.7	1.1	1.6	2.1
TECHSNABEXPORT									
Available for sale	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Contracted requirements[a]	1.6	1.9	1.8	1.8	1.4	1.4	1.4	1.3	0.9
Excess Techsnabexport capacity	1.4	1.1	1.2	1.2	1.6	1.6	1.6	1.7	2.1
Total Excess Capacity	4.1	3.2	3.9	4.2	5.7	6.3	6.2	6.5	7.5
Uncovered Non-U.S. Requirements (i.e., not under contract)[a]	0.6	0.8	0.8	0.5	1.1	1.2	1.4	1.7	2.7
Net Excess Capacity Outside of DOE	3.5	2.4	3.1	3.7	4.6	5.1	4.8	4.8	4.8
Possible Additional Prod. (see text)									
Eurodif	1.5	2.0	2.5	3.0	*	*	*	*	*
Urenco	0	0	0	0	0.1	0.3	0.6	1.0	1.5
Total Potential Excess Capacity	5.0	4.4	5.6	6.7	>7.7	>8.4	>8.4	>8.8	>9.3
U.S. DOE Projection of Its Civilian Domestic Requirements[b]	6.0	6.3	9.3	8.6	8.6	8.8	8.1	9.1	8.6

[a] NUKEM estimates of June 1986.

[b] DOE's 1985 Uranium Enrichment Mid-Case" at 0.2% tails assay.

*By this time, large amounts of new enrichment capacity could be in operation, if market conditions warrant it.

outside DOE over the four year period 1987 through 1990 sums to 12,700,000 SWU. From examination of competitor claims, intentions and technology, we believe the equivalent of up to another 9,000,000 SWU could be made available in that same period if a market opportunity presented itself.

What is not shown in Table 1 is the existing inventories of SWU in the free world. Current industry estimates of non-DOE inventory levels are about 15,000,000 SWU. This overhang of supply has been one of the attributed causes of the recent instability in the SWU market.[1]

REVIEW OF COMPETITOR CAPABILITY

COGEMA

COGEMA is the commonly used name of Compagnie Generale des Matieres Nucleaires, a group of French companies covering all phases of the nuclear fuel cycle. No part of the fuel cycle has escaped COGEMA interest and participation. They provide goods and services to utilities from exploring for and mining uranium ore to reprocessing spent fuel. They are technically capable, sophisticated and formidable as a competitor to DOE.

COGEMA has controlling interest in the world's newest and largest full-gradient gaseous diffusion plant. The plant is a joint venture among French, Belgian, Italian and Spanish partners. The business entity is Eurodif, S.A. COGEMA holds a 51.5% share in the Eurodif, S.A. plant. The partners take shares of production based on their ownership fraction and additional production is sold by COGEMA in the world market. It is now the second largest supplier of enrichment services in the U.S.[2] We expect a continued effort by COGEMA to market SWU in the United States and to other non-U.S. DOE customers. Speaking of the current Western Nuclear suit, the president of COGEMA recently stated:[2]

> "Regardless of the outcome of the litigation, COGEMA, Inc. stands ready to serve the U.S. utility industry, within the constraints of its production capabilities."

In an official publication COGEMA indicated its success in obtaining new SWU customers:[3]

> "In this general climate, Eurodif mandated COGEMA to market the available production capacity of its partners. COGEMA thus applied its sales potential abroad and succeeded in winning a number of short and long-term supply contracts in several countries which have operational nuclear power plants."

Given this evidence of will to compete, one must consider the capability to compete. We believe the Eurodif plant is operating at 80% of its design power level.[4] Gaseous diffusion plant production is almost linear (directly related to) power input.[5] Accordingly, Eurodif could in 1987, for example, increase production by 2,700,000 or so SWU per annum merely by increasing power. The Tricastin site includes four 930 MWe nuclear power units, operated by Electricite de France.[6] Any three of the four units are able to supply more power than necessary to run the enrichment plant. Further, Tricastin is tied into the French national power grid. It is therefore very likely that additional power can be provided to the plant on short notice.

In place of, or more importantly in addition to power increase, production increases (as measured in kilograms of uranium enriched to a given assay rather than SWU) can be obtained by increasing the operating tails assay of the enrichment plant. Such changes can be implemented on very short notice. Consider a plant producing LWR fuel at 3% U-235 which is normally operated at a tails assay of 0.24% U-235. If it is changed to operate at 0.30% tails assay, the production of enriched uranium increases by 14%. If the tails assay is raised to 0.40%, the amount produced increases by 37%. Because of the concomitant sharp increase in feed consumption, the technique of raising tails assay (also called "overfeeding") is considered to be a temporary expedient. These temporary expedients in operation are, however, a serious threat to DOE's market position because they would allow COGEMA to move in and take customers while permanent production increases with which to hold those customers were implemented. Another semi-permanent expedient is to operate the plant at power levels above the nameplate rating. Some increases can be made without equipment modifications by using up design margins which always exist. The extent to which this can be done in Eurodif is unclear, but a 5 to 10% production increase would not be unexpected based on U.S. experience. Costs, in addition to those associated with the increased power, would be incurred in reduced life and reliability of process equipment if its operating limits were pushed.

Permanent production increases can be achieved via any one or a combination of the following methods, listed in order of increasing cost of production:

- Uprating the plant so it can efficiently use more power,
- Building additional gaseous diffusion stages at the Eurodif site, and
- Building a new enrichment plant employing either gaseous diffusion technology or some other process.

All of these methods, including running the plants at elevated power levels without other equipment changes, are well known both to the DOE and to the French.[7] Through the 1970s and into the early 1980s, the DOE improved and uprated its gaseous diffusion plants. Plant equipment was modified to accept approximately 20% more power and to produce approximately 20% more SWU per annum.[8] It is not clear how much capacity could be obtained by uprating the Eurodif plant, but 10 to 20% is not unreasonable based on U.S. experience. The time horizon on uprating might be of order three years. Almost any amount of additional capacity could be obtained by adding new stages to the Eurodif plant. Furthermore, the increment of added capacity could be large or small as required by demand because the stages in the existing plant can be used to achieve the plant gradient in assay. The cost of production would include a capital portion but it would be significantly less than the average cost of building a new gaseous diffusion plant because many support facilities and services are already on site. Based on the impressive French experience in building Eurodif, new stages could be in production within less than five years from the decision to build.[9]

With regard to construction of new capacity, the French have options other than gaseous diffusion. Two enrichment technologies potentially available to COGEMA are AVLIS and chemical exchange. It is well known that the Commissariat a l'Energie Atomique is working on its own AVLIS process.[10] This technology is eight to ten years from industrial demonstration. For the near term, France also has developed chemical exchange as a "serious backup" to gaseous diffusion and claims its estimated costs are about 65% of those currently experienced in the Eurodif plant.[11]

In summary, the production level of the Eurodif plant can be increased up to its nominal nameplate level by simply adding power. This is a quick response action, it is economical, entirely safe, and can be continued indefinitely in time. If the plant is currently being operated at 80% of capacity, an additional 2,000,000 SWU per annum can readily be obtained. A short-term further increase of perhaps the equivalent of 1,500,000 to 3,000,000 SWU per annum could be obtained by a combination of power increases beyond design levels and high tails assay operation. By these means COGEMA might be able to deliver significantly more production than the nominal rating of Eurodif indicates. And this could be done on very short notice. These gains could be solidified, i.e., changed from a short-term expedient to long-term operation by uprating the plant and/or building new stages. The amount of production is dependent upon need but the limits are quite high. These actions probably would take three to five years to implement. Capacity increases beyond raising the power level up to nameplate capacity are listed in the "Possible Additional Production" portion of the Table 1 presentation of production and demand balances because they would be done at whatever time and in whatever amount is needed.

URENCO

Urenco Ltd. is a West European enrichment partnership which uses the gas centrifuge process. It was established in 1971 as a consequence of the Treaty of Almelo signed by the United Kingdom, Holland and West Germany. Urenco Ltd. shareholders include British Nuclear Fuels plc, Ultra-Centrifuge Nederland N.V., and Uranit GmbH. The production enterprises, also structured as partnerships, are Urenco (UK), Urenco Nederland v.o.f. and Urenco Deutschland oHG. Urenco, Inc. is the marketing and contract administration arm in the United States. Urenco performs its own R&D, machine components manufacturing, plant design and operation. It markets its enrichment services in at least five non-partner nations including the United States.[12]

Urenco is an established competitor in the free world. They currently operate a 650,000 SWU per annum plant at Capenhurst, England, a 1,000,000 SWU per annum plant at Almelo, the Netherlands, and a plant of over 200,000 SWU per annum at Gronau, FRG.[13] Urenco has been operating plants and delivering product for ten years and through the end of 1985 had delivered 5,000,000 SWU. Their expansion policy is and always has been to track demand. They describe their strategy as follows:

> "Urenco plants are constructed to a modular design and capacity additions can be adjusted so that production corresponds closely with delivery requirements. This construction policy enables Urenco to avoid investment in idle capacity. Urenco's capacity is expected to increase to 3 million SWU per annum by 1990 and to over 4.5 million SWU per annum by the year 1995."[12]

The business strategy of Urenco has recently been described in the following terms:[14]

- Dominance in home markets (i.e., United Kingdom, Netherlands and the Federal Republic of Germany).
- Increasing market shares in other European countries, such as Sweden and Switzerland, and in other nations such as Brazil.
- "Urenco is hopeful of increasing its share in the very large (U.S.) market."
- "Gas centrifuge technology already has a significant cost advantage over gaseous diffusion and this margin will progressively increase as improved centrifuges are deployed."
- By 1986 Urenco will have re-enriched 1500 MTU of reprocessed uranium. Orders are in hand for re-enriching several thousand tonnes of magnox fuel.
- Research on laser enrichment is being done by each of the partners for the long term.

These are clearly the statements of a determined competitor. The statement related to Urenco's desire to penetrate the United States market supports the formation of Urenco, Inc. in February 1985.[12] In addition to these statements of intent, Urenco has for some time talked of building an enrichment plant in the United States which would compete directly with the DOE for the domestic market. Dr. Johannes Asyee, president of Urenco, Inc., recently confirmed that his firm is "very seriously" pursuing the idea.[15]

Urenco has demonstrated the capability to add capacity at an annual rate of 300,000 SWU per annum. Urenco's present expansion policy[12] shows their expectation to continue at this rate of growth over the next five years. It is reasonable to suppose this conservative rate of capacity addition could be higher if business opportunities warrant it. In fact, in 1982 Urenco Ltd.'s Technical Director of the Management Committee said "...if required, we could easily expand capacity to 10,000,000 SWU/a by 1990" or three times the planned 1990 capacity at that time.[16] Centrifuges could be built at a higher rate and, as technology is advanced, each centrifuge added is capable of producing SWU at a greater rate. Urenco claims[13,14] that the capacity of centrifuges being deployed in 1991 will be twice as high as that in 1986 centrifuges. Further, over the next decade they project a factor-of-two reduction in cost.[14] The time scale for constructing capacity can be estimated from the fact that Urenco received the first part permit to open the Gronau site (West Germany) at the end of 1981 and had more than 200,000 SWU per annum of capacity in operation by the summer of 1986. Since that site is now open and qualified for 1,000,000 SWU per annum and suitable for 5,000,000 SWU per annum, subsequent capacity increments could be added in four years or so.[17]

Urenco has been very active in centrifuge process R&D for many years. They have achieved significant gains in centrifuge capacity and reductions in plant specific investment. They also project the achievement of further gains in the future.[14] As a result, with each increment of production capacity they add, they make technology gains as well as learning curve gains. Based on analysis of Gronau plant costs[18] and Urenco's past statement that operating costs comprise one-fourth of their unit SWU cost, it can be estimated that new capacity coming into production today has production costs of about $100 per SWU at July 1986 exchange rates (2.1 DM per $), assuming a reasonable write-off rate for capital.

In summary, Urenco is a vigorous competitor with the intent and means to supplant DOE as a supplier of enrichment services at home and abroad if the opportunity is given. They have a focus on the U.S. market and, with their policy and demonstrated capability to re-enrich reprocessed uranium, have a market niche that COGEMA and DOE have been reluctant to enter in a significant way. Urenco has little idle capacity (see Table 1) and centrifuge plants do not possess the operating flexibilities that gaseous diffusion plants do. Urenco does, however, have the capability of building significant production increments on relatively short time scales at costs which should make them attractive under prevailing circumstances.

TECHSNABEXPORT

Techsnabexport is the nuclear fuel cycle marketing arm of the Soviet Union. They have long been present in the free world marketplace and often have priced their SWU at slight discount from DOE's price. They have consistently offered up to 3,000,000 SWU per annum to utilities in the West, presumably as a means of acquiring hard currencies.

Recently, Techsnabexport has been more aggressive in its marketing approach. It was reported[19] that in late 1985 they had signed a formal protocol with SWUCO, a U.S. firm, to form SISCO, the SWUCO Inventory Storage Company. Under this protocol, SISCO will purchase Soviet uranium enrichment services and resell them to United States utilities. Shortly after the formation of SISCO, it was widely rumored and denied[20] that Pacific Gas & Electric Co. and American Electric Power Co. were considering SWU purchases from SISCO. On January 23 Representatives Marilyn Lloyd (D.-Tenn.) and Bob McEwen (R.-Ohio) introduced a bill to prohibit U.S. utilities from purchasing enrichment services from the Soviet Union. Although legislation might be passed to stop domestic utilities from using Techsnabexport as a source of supply, foreign utilities can and would buy Soviet SWU if summarily excluded from supply by DOE. Even if they preferred not to enter long-term supply agreements with Techsnabexport, utilities could sign two to four year contracts while COGEMA and Urenco put in place the required capacity.

SUMMARY

DOE's competitors have both the will and means to expand their sales at DOE's expense if given the opportunity. In addition to perhaps 15,000,000 SWU of enriched uranium inventories existing today, uncommitted existing production capacity in the hands of DOE competitors will amount to 3,500,000 SWU in 1987 alone. During the five-year period from 1987 through 1991, the total net excess SWU available outside of DOE sums to 17,300,000 SWU. This sum is 45% of the cumulative DOE expectation of domestic civilian requirements it will supply. This 45% figure approximates the fraction of foreign-origin uranium now held by U.S. utilities who are present DOE SWU customers.

From examination of competitor claims, past performance and technology capability, we believe it is possible for DOE's competitors to increase significantly their production, first on a temporary basis and later on a permanent basis. It is possible to add quickly 1,500,000 to 3,000,000 SWU per annum production capacity at COGEMA's Eurodif plant beyond its nameplate rating. These temporary production increases would be used only until new permanent capacity could be brought on line. By 1991 COGEMA and Urenco could be operating new permanent SWU capacity and be constructing plants to produce whatever quantities of SWU the market allows. These permanent additions would be implemented at attractive cost.

9

REFERENCES

1. See, for example, Wolfgang Schober, "The Enrichment Market," *Transactions of ENC '86*, Vol. 5, p. 379-382. ENC '86 is the European Nuclear Conference held June 2-6, 1986, in Geneva, Switzerland.

2. Francois V. Bujon in the "President's Letter," *Annual Report 1985*, COGEMA, Inc.

3. *COGEMA 84*, an information and financial statement brochure issued by COGEMA, p. 3.

4. See, for example, *NuclearFuel*, McGraw-Hill Publishing Co., September 9, 1985, issue, p. 12. Here COGEMA's Jean-Claude Guais reports that Eurodif has operated at as low as 40% of capacity, was at an average of 66% capacity in 1986 and will approach 85% in 1986.

5. See, for example, performance curves published for the U.S. gaseous diffusion plants in *AEC Gaseous Diffusion Plant Operations*, United States Atomic Energy Commission report ORO-658, February 1968, p. 25-26.

6. "Uranium Enrichment by Gaseous Diffusion at the Eurodif Tricastin Facility," a descriptive brochure published by Eurodif, S.A., or *COGEMA: The Nuclear Fuel Company*, a descriptive brochure on the structure and operations of COGEMA, May 1986, p. 4.

7. J.-H. Coates, et al., "Theoretical Aspects of the Capacity Expansion of a Gaseous Diffusion Isotope Separation Plant," from *CEA Bulletin d'Informations Scientifiques et Techniques*, No. 206, September 1975, p. 58-70.

8. *United States Gaseous Diffusion Program for Enrichment*, United States Department of Energy, 1978, p. 12.

9. The Eurodif construction schedule was summarized in "Eurodif/Coredif: Present and Future," a talk given in June 1982 at session 3 of FORATOM III by Jean-Pierre Rougeau, marketing director of Eurodif. According to this source the decision to build was made in November 1973; the site was selected in the spring of 1974; civil works began in early 1975; uranium hexafluoride was introduced in the cascade in February 1978; and the nominal design production level was reached at the end of 1981. Thus, four and one-half years elapsed from the decision to build to the introduction of feed.

10. *Programs and Activities*, a descriptive brochure published by Commissariat a l'Energie Atomique, February 1986, p. 5, which shows a photograph of the French electron-beam evaporation test unit. See also page 9 of COGEMA, Inc. *Annual Report 1985* which quotes a $40 million AVLIS research budget for 1986.

11. See the article cited in reference 4 above.

12. URENCO 1985, the annual report of Urenco Ltd.

13. G. H. Inglis, et al., "Centrifuge Enrichment - The Next Ten Years," a paper presented in the FORATOM IX session on The Nuclear Fuel Cycle, Geneva, Switzerland, June 4, 1986. The paper is printed in Vol. 5 of the transactions of ENC '86.

14. T. T. Edwards, D. Aston and Malcolm Holmes, "Centrifuge Development: The Key to Continued Success," paper presented at FORATOM IX, Transactions of the European Nuclear Conference, Vol. 4, Geneva, Switzerland, June 2-6, 1986.

15. See, for example, Ron Bridgeman, "Foreign Firm Considers U.S. Enrichment Plant," The Oak Ridger, Vol. 38, No. 133, July 23, 1986, p. 1; and "Dutch Partner Says Urenco Negotiating with U.S. Firms to Build SWU Plant," NuclearFuel, May 19, 1986, p. 2.

16. J. V. L. Parry, "Status Report on Urenco's Progress and Plans," American Institute of Chemical Engineers, AIChE Symposium Series No. 221, Vol. 78, p. 18-23, 1982. This material was presented orally at the Orlando AIChE Convention.

17. Dr. Hans Mohrhauer, Managing Director of Uranit, GmbH, "Uranium Enrichment Plant Gronau - the Third Urenco Site," Nuclear Europe, February 1984, p. 35-37.

18. According to reference 16, the specific investment cost of the newest Urenco plant, to be completed at Gronau by the end of this decade, was projected to be about 1000 DM per annual SWU in 1980 money for 1980 technology. Due to further technology gains (see reference 14), the specific investment in 1986 money is expected to be about the same, i.e., 1000 DM per annual SWU. If the investment is written off at 16% per annum (10 year write-off, 10% p.a. interest), the investment cost is 160 DM per SWU. Based on reports that operating costs amounted to 25% of Urenco's total SWU cost, that total SWU cost must be approximately 210 DM per SWU or $100 per SWU at prevailing exchange rates.

19. "Notes from SWUCO," in the SWUCO Report, No. 61 for February 1, 1986, p. 2.

20. See, for example, "SWUCO Planning to Sell Soviet SWU in U.S.," NuclearFuel, December 30, 1985, p. 10; "PG&E, AEP Apparently Rule Out Purchases of Soviet Enrichment Services," NuclearFuel, January 27, 1986, p. 11; and "SWUCO Aiming to Market Soviet SWU to U.S. Utilities," Nucleonics Week, January 2, 1986, p. 4. NuclearFuel and Nucleonics Week are McGraw-Hill Publishing Co. publications.

QUESTIONS FROM SENATOR BINGAMAN

Question 10: Would you also supply for us a list of those utilities relying on foreign sources enrichment supply, including whether that reliance is in the form of spot market purchases or long-term contracts, and the country supplying the enrichment?

Answer: A listing of domestic utilities that rely on foreign sources for enrichment supply is attached.

Domestic Utilities that Rely on Foreign Sources for Enrichment

Utility	Supplier/Country	Type of Contract	Length of Contract
South Carolina E&G	Cogema/France	Partial	1987-1990
Wisconsin P.S.	Cogema/France	Partial	1988-1991
Florida Power & Light	Cogema/France	Partial	1987-88, 1991-95
Yankee Group	Cogema/France	100% Requirement	1987-1996
SMUD	Urenco/UK, FRG, Netherlands	100% Requirement	1987-1996
Boston Edison	Urenco/UK, FRG, Netherlands	100% Requirement	1987-1996
Pacific Gas & Electric	Brokers/various European countries	Spot Market	1987
American Elec. & Power	Brokers/various European countries, others	Spot Market	1987

QUESTIONS FROM SENATOR BINGAMAN

Question 11: I understand that DOE takes the position that it cannot limit enrichment of foreign source uranium, because to do so will raise its price and cause it to lose business. It is my understanding that the old Atomic Energy Commission testified that it had power to impose a domestic content requirement on enrichment services and uranium by order, regulation, or license condition to carry out the uranium viability provision or to protect its enrichment enterprise. Although DOE now lacks licensing authority, it knows how to issue orders and regulations. Has DOE considered this course, and if not, why not?

Answer: During the time span of the Atomic Energy Commission, the United States had a monopoly on the world's commercial enrichment capacity. Thus, under Section 161v of the Atomic Energy Act of 1954, as amended, the Atomic Energy Commission could require that only U.S. uranium was enriched for domestic end-use, because domestic utilities could not turn to anyone else for their enrichment services.

Currently, commercial enrichment services are also provided by plants in France, the United Kingdom, the Netherlands, the Federal Republic of Germany, and the Soviet Union. The Japanese are operating a small pilot plant and are building a moderate size demonstration plant. They have plans to have a full size commercial enrichment plant operating in the early 1990s. Thus, DOE lacks the leverage that would be provided by being a monopoly supplier, because enrichment services are available, at comparable or lower costs, from foreign

Answer 11
(continued):

sources. If DOE were to impose restrictions under Section 161v on the enrichment of foreign uranium for domestic end-use, DOE's customers would turn to foreign suppliers for uranium ore and enrichment services. Such a loss of enrichment sales by DOE will actually risk further damaging the U.S. mining industry, because utilities that purchase enrichment services abroad almost certainly will also purchase foreign uranium.

QUESTIONS FROM SENATOR DOMENICI

Question 12: What are the incremental costs (in $/SWU) associated with DOE payments of "demand charges" to TVA for power not used? Could you elaborate on your reasons for justifying a reduction in these demand charges? Have you received a response from TVA yet?

Answer: In FY 1987, the unit cost of the TVA demand charges for each SWU produced will be about $81 per SWU. In FY 1988, this increases to about $131 per SWU.

In the past year, the Department has intensified its efforts to obtain relief from the charges being imposed by TVA for DOE's unpurchased power. In July 1986, the Department submitted testimony during TVA's FY 1987 ratemaking process. In that testimony, DOE proposed a revised rate structure which would have made TVA's rate structure more consistent with those of the larger nuclear utilities in the country. DOE's proposal would have reduced its annual bill for unused capacity by over $200 million, while simultaneously reducing our estimate of TVA's charges to its residential customers by about $40 million. The proposal was rejected by TVA.

Our activities since the July 1986 rate review have focused on the extent to which TVA's charges exceed the costs which it incurs related to the contract. These studies strongly indicate that TVA is charging DOE a great deal more than it should. This overcharge is due primarily to costs associated

Answer 12 (continued): with plants that are unrelated to TVA's obligation to supply power to DOE. In addition, we have concluded that TVA is unjustified in continuing to bill DOE for a capacity charge premium. Such premiums are no longer encompassed by TVA's prevailing cost of service study and rate structure. Also, we have concluded that equitable reductions in DOE's capacity charges are possible without near-term rate increases to other TVA customers by pursuing alternative accounting approaches which are consistent with generally-accepted accounting and ratemaking techniques and are within TVA's authority to implement.

Discussions are currently underway regarding the issues raised by the Department. The DOE Assistant Secretary for Nuclear Energy and the DOE General Counsel met with the TVA Chairman and key TVA officials on February 18, 1987, for initial discussions. These were followed by staff level meetings held on February 24, 1987, in Knoxville and on March 6, 1987, in Chattanooga. These discussions are continuing. They have not yet enabled the Department and TVA to come to any agreement on how to resolve these issues. A follow-up meeting among the principals is scheduled for early April. We remain hopeful that a mutually acceptable solution can be found.

QUESTIONS FROM SENATOR DOMENICI

Question 13: What is the status of negotiations between DOE and the American Enrichment Company (AEC), concerning AEC's interest in operation of the Gaseous Centrifuge Enrichment Plant (GCEP) facilities in Portsmouth? I understand that the White House and OMB are pushing this AEC proposal, but that DOE is concerned that the AEC arrangement amounts to a "giveaway" of federal assets. How much have we invested in the GCEP facilities? Would AEC pay for these sunk costs? Is this type of arrangement similar to what a foreign competitor--say, France or England--would do to bring new interest and investment in new enrichment technology? Would AEC be a competitor to DOE? Would that be like shooting yourselves in the foot?

Answer: DOE has not entered into negotiations with the AEC. The Department is still evaluating the AEC proposal and should be in a position to notify the AEC of its conclusions in the near future. Until negotiations are completed, we cannot comment on whether AEC will be a competitor of DOE.

The Government has invested approximately $2.6 billion in the GCEP facility.

Neither the Department nor OMB intends to enter into an arrangement that amounts to a "giveaway" of federal assets. The AEC proposal is being given full consideration because it offers the possibility of using facilities that could provide greater value to the U.S. than that offered by alternative users. In addition, the concept may further the

Answer 13 (continued):

Administration's goal of getting the private sector involved in uranium enrichment.

In our judgment, our foreign competitors would not follow this approach to attract investment in new technology. More likely, our competitors would either (1) raise capital by borrowing or through a stock offering, or (2) negotiate a mutually beneficial joint venture with another firm(s) which possessed unique capabilities that could contribute to ones technical and business objectives.

QUESTIONS FROM SENATOR DOMENICI

Question 14: What is the status of URENCO's efforts to establish private enrichment facilities in the U.S.?

Answer: It is our understanding that Urenco has initiated discussions with NRC for the purpose of identifying requirements for the licensing of a plant in the United States. Furthermore, exploratory talks with investors, utilities, and architect engineering firms have been conducted to various degrees of detail with the stated intention of possibly building, licensing and operating a Urenco centrifuge plant in the United States for sales to the U.S. utility market.

QUESTIONS FROM SENATOR DOMENICI

Question 15: Is anyone interested in taking over DOE's diffusion plants as a private enterprise? Why?

Answer: In response to our request for expressions of interest, a consulting firm showed interest in future discussions concerning sale of the diffusion plants. This interest was contingent on DOE making a number of policy statements and request possible legislation to resolve a number of institutional issues and contingent liabilities.

QUESTIONS FROM SENATOR DOMENICI

Question 16: While some of your recent program and policy changes have definitely helped to bring your enrichment costs down to a price more competitive with foreign prices, doesn't your long-term ability to remain competitive depend on development of AVLIS or some other advanced technology? Then how can you justify zeroing of your AVLIS program in the FY88 budget request?

Answer: AVLIS technology, if deployed, would enable the United States to place a "cap" on the long-term cost of SWUs in the world marketplace, because it uses much less energy than the gaseous diffusion plants (GDPs). However, the two GDPs at Portsmouth and Paducah have sufficient capacity and are projected to remain sufficiently economical to meet DOE's production requirements through the end of the century. Certain events, such as the passage of acid rain legislation or changes in environmental or seismic criteria, could dramatically change the competitiveness of the GDPs. In such an event, the ability to deploy AVLIS would provide the United States with a distinct competitive advantage.

Nevertheless, the cost to complete AVLIS through the engineering demonstration phase exceeds $400 million, and deployment would require considerably more. The uranium enrichment enterprise is besieged by a number of serious issues--resolution of the uranium miner's lawsuit, payment of the unrecovered Government investment in the enterprise to

Answer 16
(continued): the Treasury, the potential for significant sales losses in complying with the Comprehensive Anti-Apartheid Act of 1986, and the payment of the multi-billion dollar demand charges to TVA for power not used. Given these issues and current budget constraints, the Department is not requesting funds in FY 1988 for further AVLIS development.

QUESTIONS FROM SENATOR DOMENICI

Question 17: What types of technology are our foreign competitors developing for replacement and/or additions to their current enrichment capacity? How is the research on advanced technologies being funded in these countries? Is it included in their SWU costs, or is it funded by the Government under a separate R&D account?

Answer: Our European competitors, Cogema/Eurodif and Urenco, are developing AVLIS and advanced gas centrifuge technologies, respectively, for the replacement or expansion capacity for their current production facilities. Government budget reports and industry documents in Europe indicate that most, if not all, of the research on these advanced technologies is funded by the Governments involved. Very little of these research costs are included in our competitors' SWU costs until actual deployment occurs, at which time some question remains as to how much of or when these costs are recovered.

QUESTIONS FROM SENATOR DOMENICI

Question 18:	What would the incremental cost be to Defense Programs (in $/SWU), if the civilian portion of DOE's enrichment business was terminated due to loss of market?
Answer:	The net cost to Defense Programs would increase. Fixed costs that are currently shared by civilian customers would need to be borne entirely by Defense Programs if the civilian market were lost. The actual increase depends on the level of military requirements in any given year. In the extreme case where Defense Programs would have to bear all fixed costs, including the TVA demand charge, their rates would increase by nearly a factor of 10.

QUESTIONS FROM SENATOR BINGAMAN

Question 19: Why did you not charge Defense Programs for their SWU's prior to 1978? Why do you now charge less for Defense Programs enrichment services than you do for civilian? How much less? How did you "account" for the "free SWU's" prior to 1978? Did any of these Defense Programs services get subsidized in any way (directly or indirectly) by the civilian customers? Can you prove this?

Answer: The Department began to charge Defense Programs explicitly for their enrichment services beginning in FY 1983. The price to Defense Programs was set at the commercial price less components for depreciation and imputed interest. However, between 1969 and 1983 Defense Programs was effectively charged the direct (power, operation and maintenance) costs by appropriate budget entries.

A change was made in FY 1986 to separately account for and price the higher costs related to high assay enrichment. The separate pricing for high assay material did not begin until 1986 because our accounting system did not identify the costs associated with high assay production.

The Department's accounting system recognized that Defense Programs has not paid for depreciation and interest costs. This accounting system made the necessary entries to avoid charging these costs to commercial users. The annual financial statements reflect these transactions.

Answer 19 (continued): The only identified costs of providing enrichment services to Defense Programs that were paid for by the commercial customers were the additional costs of providing SWU's at high assay enrichment prior to 1986. An adjustment was not made for these costs because data does not exist to make such an adjustment. Further, we believe these costs to be comparatively minor, as most of the additional costs relate to safety and security costs that have been added in recent years. We are continuing to examine the costs of providing enrichment services to ensure that costs are appropriately being allocated between Government and commercial users. Future adjustments will be made as necessary.

QUESTIONS FROM SENATOR DOMENICI

Question 20(a): You have extricated all excess fat from your enrichment business (shutdown of Oak Ridge diffusion plant, reduction in electricity costs, termination of GCEP and AVLIS), except for two things: (1) the resolution of the enrichment debt issue and (2) reduction of TVA demand charges. If these two issues could be resolved in your favor, would your SWU costs then be competitive with foreign countries?

Answer: Yes. Resolution of the TVA demand charge impasse and the enrichment debt issue would result in DOE being able to provide enrichment prices on a highly competitive basis over the long term. This would ensure a healthy, competitive U.S. enrichment business, national and energy security benefits, a positive impact on balance of payments, an employment contribution and enhanced value to the Government for its investment in the enrichment enterprise.

QUESTIONS FROM SENATOR DOMENICI

Question 20(b): Would "privatization" of the enrichment business do anything, in and of itself, to make the debt and TVA issues go away?

Answer: No. To the contrary, resolution of the debt and TVA issues are preconditions to "privatization."

QUESTIONS FROM SENATOR DOMENICI

Question 21: Part of the $3.4 billion "debt" (or "unrecovered costs") that OMB says utilities owe to the enrichment services account is the capital cost of the facilities at Paducah and Portsmouth. If utilities were to pay off this "debt", would they have then, in effect, purchased these plants from DOE? Is that your intent--a kind of back-handed "privatization" scheme? (I am being facetious, but do you see how ludicrous this debt accounting is?)

Answer: Of the $3.3 billion unrecovered Government investment, about $1 billion is related to undepreciated plant and equipment at Paducah and Portsmouth. The depreciation charges relating to these plants will be included in future prices. Customers who pay for depreciation charges do not own the plants that are being depreciated. The inclusion of depreciation costs is necessary for the Government to recover its costs as required by law. (There is no attempt to privatize the enrichment plants by collecting depreciation charges.) Such a costing practice is a normal business arrangement. In fact all utilities include depreciation charges in their rate base, but the customers of the utilities do not own the plants after paying depreciation charges.

QUESTIONS FROM SENATOR DOMENICI

Question 22(a): DOE has zeroed funding in its FY88 budget for the advanced enrichment program known as AVLIS (atomic vapor laser isotope separation). How much of the FY87 funding for AVLIS would have to be diverted for termination costs, assuming Congress does not restore funding in FY88? At what point in time would these termination activities have to begin this year? Where would the largest employment dislocation occur?

Answer: An orderly closeout of the AVLIS program would require approximately $50 million, with employment dislocations occurring mainly at LLNL. Although the closeout of the AVLIS program could be accomplished by a reprogramming action of the FY 1987 budget, an FY 1988 Budget Amendment Request, or a combination of both, we are not prepared to recommend such action at this time.

As you are aware, DOE recently concluded that restructuring the enterprise through the establishment of a Federally-chartered corporation, which can be sold to the public through a stock offering at the appropriate time, can enhance its efficiency and competitiveness. (A copy of this report was provided to the Subcommittee on March 31, 1987.) Through the establishment of such a corporation, DOE believes the decision on the scope and pace of AVLIS development and deployment would appropriately evolve.

QUESTIONS FROM SENATOR DOMENICI

Question 22(b): What are foreign countries doing with respect to development of AVLIS or other advanced enrichment programs? Within what time frame will these new technologies be brought into commercial operation?

Answer: Many countries (including Israel, the Federal Republic of Germany, Brazil, Japan, France, the United Kingdom, and the People's Republic of China) have publicly expressed their desire to investigate a laser isotope separation process for the enrichment of uranium. To our knowledge, only Japan and France have scheduled commercial operations, which should begin around the turn of the century. At present, we consider that the U.S. AVLIS program has a several year lead on these competitors.

QUESTIONS FROM SENATOR DOMENICI

Question 22(c):	What are the cost savings (in terms of $/SWU) predicted for AVLIS, as compared to our diffusion plants?
Answer:	The attached chart summarizes the average production cost of the gaseous diffusion plants as compared to the projected AVLIS production cost, and the projected range of cost savings due to an AVLIS productions plant. Electric power costs are based on 1986 rates.

The Promise of AVLIS

	Per SWU
• Avg. GDP Production Costs	$65 - $80
• Projected AVLIS Production Costs	$30 - $45
• Projected Range of Cost Savings	$20 - $50

QUESTIONS FROM SENATOR DOMENICI

Question 22(d): If the U.S. does not develop AVLIS in a reasonable time period, is there any way our diffusion plants can remain competitive with foreign enrichment services, should foreign countries proceed with AVLIS development?

Answer: We do not believe that our diffusion plants can remain competitive in the marketplace in the long run if our competitors proceed to deploy the AVLIS technology. We are also concerned over the ability of the diffusion plants to compete with Urenco if they continue to deploy their low-cost centrifuge technology.

QUESTIONS FROM SENATOR DOMENICI

Question 23(a): As I understand it, a significant portion of your enrichment business involves contracts to enrich uranium for foreign utilities, primarily utilities in Japan, Korea, and other Pacific Rim countries. What proportion of your business does this represent?

Answer: Total foreign commercial sales in FY 1987 are expected to be nearly 3.5 million SWU, worth about $400 million, or about 40 percent of DOE's total commercial enrichment sales.

Sales in the Pacific Basin area specifically involving utilities in Japan, Taiwan, and Korea represent about 30 percent of DOE's business valued at about $300 million annually. Japan represents approximately 20 percent of DOE's total enrichment sales while Taiwan and South Korea each represent approximately 5 percent of DOE's market.

QUESTIONS FROM SENATOR DOMENICI

Question 23(b): Our domestic utilities do not buy any uranium from South Africa. However, there is a significant amount of South African uranium which our Pacific Rim customers have committed to buy under contract, and this uranium is then enriched at our DOE facilities for shipment to these foreign utilities. Now, these foreign countries have no control over our anti-apartheid policies, but nevertheless, if our policies interfere with their ability to deliver uranium to our DOE facilities for enrichment, wouldn't that force these foreign customers to go elsewhere for their enrichment services?

Answer: If Pacific Basin customers are precluded from shipping their South African origin uranium ore or oxide to the United States for processing and re-export, the potential impacts to the United States are substantial. These utilities have long-term investment in and economic ties to companies that mine South African uranium. These sales relationships would likely continue, and enrichment services could be obtained from France, Urenco or the Soviet Union, rather than the United States, if the customers were precluded from delivering South African uranium to DOE for enrichment and re-export. DOE could potentially lose 20 to 30 percent of its total enrichment sales or about $200 to $300 million annually.

Also, the U.S. commercial uranium conversion companies and fuel fabricators could face losses in the hundreds of millions annually if these customers are not allowed to import their South African uranium for processing and subsequent re-export.

QUESTIONS FROM SENATOR DOMENICI

Question 23(c): If we lost these foreign customers, could that reduce our enrichment business enough to force shutdown of one of our two currently-operating enrichment plants? Which plant would likely be shut down first?

Answer: If DOE lost this market, e.g., up to 30 percent of its business, then a situation would exist where shutting down one of the two currently operating enrichment plants would be a distinct possibility. If this were realized, the Paducah plant would be shut down first.

QUESITONS FROM SENATOR DOMENICI

Question 23(d): If we lost these foreign customers, would that cause the SWU costs to go up for our domestic customers, in order to absorb the "fixed costs" within a smaller customer base? Would these increased costs then drive our own domestic utility customers abroad to seek cheaper enrichment services? Could we then be faced with a total wipe-out of our enrichment business (other than defense needs)?

Answer: Yes, SWU costs to domestic customers would increase in order to recover the "fixed costs" over the smaller sales base. Indeed, this could escalate into a situation of ever increasing sales losses from the remaining customers who then would seek more economical enrichment supply from foreign sources. This downward spiral could result in an end to commercial enrichment as a competitive, businesslike enterprise.

QUESTIONS FROM SENATOR DOMENICI

Question 24: When I visited with the White House chief of staff Don Regan and OMB director Jim Miller last summer, and told them about the condition of the uranium mining industry, and the very fragile condition of the DOE enrichment business, they were surprised, shocked, concerned, and appalled. Now I ask you, with all of this Administration's posturing as pro-nuclear advocates, and with all their concern over our nation's defense capabilities, why wasn't it DOE instead of me who carried this message to the White House? And why wasn't this message delivered to them by DOE much earlier on, so we could collectively resolve this problem before it got too late? I have to admit that I was shocked and appalled when I realized how uninformed the White House was about this very serious matter. Will I have to be the message-carrier to Howard Baker this time around, or will DOE get its act together for a change?

Answer: The Department remains concerned over the state of the domestic uranium mining and milling industry as well as that of the enrichment enterprise. The Secretary had found the mining industry to be non-viable for the last 2 years. We have sought solutions to their problems and will continue to seek actions to help the industry within our limits. The Department has provided current information in order to keep Administration officials apprised of the situation. The Department is confident that there is an understanding of the issues at high Administration levels.

QUESTIONS FROM SENATOR DOMENICI

Question 25: Your approach to the uranium enrichment business appears to be the same approach as you're taking toward maintaining the viability of the domestic mining industry. The Administration is neglecting both of them into oblivion. Wouldn't it make more sense to introduce comprehensive legislation that can act to retain both of these industries in the United States rather than gradually letting them evaporate so that the country has to rely on foreign sources of supply?

Answer: The problems facing the nuclear fuel industry are multiple and diverse. The demise of any element of the industry would have severe national ramifications. The over-riding need is to retain one of the basic energy industries in the United States. Comprehensive legislation, if properly structured, would be in the best interests of the nation.

QUESTIONS FROM SENATOR DOMENICI

Question 26(a): During your testimony last year you seemed to be very favorably disposed toward restructuring the business into a Government corporation. Despite this, you still haven't presented your recommendations to Congress. Have you changed your mind on the Government corporation?

Answer: The Department's March 31, 1987 report to Congress states that DOE's preferred restructuring option is the establishment of a Federally-chartered corporation. A corporation provides favorable business characteristics that allow more competitive, efficient management practices with clearly defined objectives, more flexible contracting and pricing arrangements, a sharper focus on the bottom-line market impact of research and development and a higher potential return to the Government on its investment in the enrichment enterprise.

QUESTIONS FROM SENATOR DOMENICI

Question 26(b): Are you thinking in terms of some sort of Comsat/Conrail type of arrangement? Would you take a copy of the plan I proposed last year in a draft of S. 1004, and comment on it for me? I think that you and I may be thinking along the same lines.

Answer: The Comsat/Conrail arrangement represents one of several frameworks which we are studying for restructuring of the U.S. enrichment business. Certain features of that type of arrangement could be fashioned to enhance the value and competitiveness of the enrichment business. There are other approaches to a government corporation, and as our March 31, 1987 letter to Senator Johnston states, we wish to move to such a corporation and are working on detailed plans for it. The Department would be glad to work with you and the committee to reach a consensus on an approach to restructuring of the enrichment business.

QUESTIONS FROM SENATOR DOMENICI

Question 27: The debt issue still looms over the uranium enrichment enterprise in a way that threatens its very existence. Is OMB still insisting that the enterprise pay $3.4 billion plus interest over the next 20 years to Treasury? Can you do this and price competitively?

Answer: The Administration's position is that the unrecovered Government investment plus imputed interest is to be recovered through enrichment prices over the next 20 years.

The law requires us to price in such a way that we recover our costs. Last year we determined that the unrecovered Government cost was $7.5 billion. We proposed to revise the enrichment criteria to reduce this amount to $3.4 billion. However, Congress rejected this provision of the criteria. Until Congressional action reduces or eliminates this burden uncertainty remains over the level of future prices. Depending upon what actions are taken by the other suppliers, our prices may or may not be competitive. While not the only factor that a utility takes into account when making a decision on a company to supply enrichment services, price is a very important factor with most utilities.

QUESTIONS FROM SENATOR DOMENICI

Question 28: Did you tell your utility customers that they had $3.4 billion debt to repay over the next 20 years when they signed the Utility Services contract in 1984?

Answer: When the utilities signed the Utility Services contract in 1984, the recovery of the Government's prior investment in the enterprise was not an issue. At that time, the customers were told that prices would be set to recover costs. The basic change from 1984 to today is that the Administration is attempting to recover the Government investment over the next 20 years. The unrecovered Government investment existed in 1984, but it was not treated as a so-called "debt" to be recovered over a fixed time period.

QUESTIONS FROM SENATOR DOMENICI

Question 29:	Isn't the debt just a measure of how much you want to get out of the business as you harvest it and turn it over to the private sector?
Answer:	The so-called "debt" represents the unrecovered Government investment in the productive assets of the uranium enrichment enterprise. It includes investment in inventories and plant plus imputed interest, less amounts previously returned to the Treasury. Our March 31, 1987, report to Congress explains that this matter must be resolved either before, or as part of, any privatization effort.

QUESTIONS FROM SENATOR DOMENICI

Question 30: If, however, your actions cause you to lose all of your contracts and customer base, doesn't that reduce to zero the value of the business? In other words, if you don't have any customers to buy your product, how does the business have any value at all?

Answer: Of course if we pursue actions that result in all our customers terminating, then the Government's investment has no future value. The Government could, however, realize a positive cash flow for the next few years because it would be uneconomical for customers to terminate and pay high termination costs.

QUESTIONS FROM SENATOR DOMENICI

Question 31: Understanding that the Administration is not very quick or forthright in proposing a solution to problems that you admit that you have, would you be willing to commit to responding to legislation that this committee might introduce to fix the problems of the uranium enrichment and uranium mining industries?

Answer: Yes. The Department will work with the committee in the consideration of legislation that is intended to fix the problems of the uranium enrichment and uranium mining industries.

QUESTIONS FROM SENATOR DOMENICI

Uranium Overfeeding

Question 32(a): The Congress approved certain criteria for the operation of the DOE enrichment business in last year's CR. One of the DOE operational practices that we specifically disapproved was a process which involves the use of stockpile uranium. In the past the DOE has considered using some of its stockpile to feed enrichment plants rather than just use the uranium supplied by the utilities. This lets the DOE save money because it is using less electricity to enrich more uranium rather than more electricity to enrich a smaller amount of uranium. It is my understanding that you have testified before the House Energy and Commerce Committee that the Department intends to undertake this practice in the coming year.

Are you presently operating in this manner?

Answer: DOE is currently operating at an average tails assay of 0.30 percent U-235, while the transaction tails assay averages about 0.27 percent U-235. Thus, DOE is overfeeding the enrichment plants.

QUESTIONS FROM SENATOR DOMENICI

Uranium Overfeeding

Question 32(b): Do you plan to operate in this manner in the future?

Answer: It is our current plan to operate in this manner in the foreseeable future. Our studies indicate that this mode of operation reduces costs.

QUESTIONS FROM SENATOR DOMENICI

Uranium Overfeeding

Question 32(c): What is the legal basis for this operation in light of the action of the last Congress?

Answer: Congress provided in the 1987 Continuing Resolution that:

> "(w)hile DOE may use the stockpile to increase its operating efficiency or reduce its other production costs (such as electricity), such steps cannot result in reducing the amount of uranium DOE's customers must provide to DOE compared to the amount of uranium those customers would be required to provide without 'overfeeding' from the stockpile."

For a given amount of enriched uranium required by an enrichment services customer, the amount of uranium delivered by the customers is only determined by the transaction tails assay, not by the operating tails assay and the amount of natural uranium that might be supplied by DOE. Thus, overfeeding the enrichment plants has no effect on the amount of uranium provided by enrichment services customers and is completely consistent with the provisions of the FY 1987 Continuing Resolution. DOE and its predecessor agencies have never operated so as to reduce the amount of uranium the enrichment customers would be required to provide. Indeed, DOE has a variable tails assay option which permits the enrichment customers to determine the amount of natural uranium they deliver and the amount of enrichment services they purchase, which increases the requirements for natural uranium.

Department of Energy
Washington, DC 20585

March 31, 1987

Honorable J. Bennett Johnston
Chairman, Committee on Energy
  and Natural Resources
United States Senate
Washington, D. C. 20510

Dear Mr. Chairman:

The Conference Report to the 1987 Continuing Appropriations Bill (Conference Report 99-1005: House Joint Resolution 738) requested the Department of Energy to respond to specific issues related to our uranium enrichment enterprise.

The Department's February 17, 1987, letter to the cognizant appropriations subcommittees forwarded a report of our reviews of the uranium enrichment enterprise and further promised a specific recommendation on restructuring of the enterprise by the end of March.

The Department appreciates your continuing interest in our enrichment enterprise and is pleased to provide you the enclosed copy of the Secretary's recommendation.

Sincerely,

A David Rossin

A. David Rossin
Assistant Secretary
  for Nuclear Energy

Enclosure

cc: Honorable James A. McClure
    Ranking Minority Member

THE SECRETARY OF ENERGY
WASHINGTON, D.C.

March 31, 1987

Honorable J. Bennett Johnston
Chairman, Subcommittee on Energy
and Water Development
Committee on Appropriations
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

The Department's letter to the Committee of February 17, 1987, forwarded a report on our reviews of the uranium enrichment enterprise and further promised a specific recommendation on restructuring of the enterprise by the end of March.

We have concluded that the enrichment enterprise can best meet its commercial obligations and challenges if it is restructured as a federally chartered corporation which can be sold to the public through a stock offering at an appropriate time. Its high enriched uranium production capabilities would remain under Federal Government ownership.

At the core of this recommendation is the belief that maintaining a strong and economical domestic commercial uranium enrichment enterprise is vital to our energy security. Restructuring the enterprise into a corporation can enhance its efficiency and competitiveness and ensure its long-term ability to meet its obligation to the Nation.

We consider that, at a minimum, a corporation, chartered by Congress to assume the responsibilities for uranium enrichment, would be empowered to: enrich uranium; engage in related business and relevant aspects of the nuclear fuel cycle; contract with customers and suppliers; conduct research and development as necessary; raise funds through access to capital markets; retain and reinvest revenues; protect commercially sensitive information; grant access to patents and other proprietary data; operate under generally accepted private sector accounting, organizational, employment and operational principles and practices; and work out the institutional hurdles involved with privatization of uranium enrichment, including Nuclear Regulatory Commission (NRC) licensing.

The successful formation of a corporation, of course, requires resolution of the major issues facing the enterprise, including the Tennessee Valley Authority multi-billion dollar demand charges, the ability to continue the development of advanced enrichment technology, the transferability of the contracts with utilities for enrichment services, the value of the enterprise to be recovered by the Government, future NRC licensing and regulation of the enrichment facilities, Price-Anderson coverage, and apportioning of eventual decontamination and decommissioning costs between the Government and the enrichment corporation.

We are confident that these formidable challenges can be met. We are eager to discuss this proposal further with you and to work with the 100th Congress to structure enabling legislation that can be enacted in 1987 to implement this recommendation.

Yours truly,

John S. Herrington

John S. Herrington

Enclosure

cc: Honorable Mark O. Hatfield
Ranking Minority Member

PROPOSED RESTRUCTURING OF THE DEPARTMENT OF ENERGY'S URANIUM ENRICHMENT ENTERPRISE

A range of options have been considered which can be categorized in the following broad terms:

- Sale or lease of all or part of the Government's enrichment assets.
- Maintain the status quo.
- Restructure the enterprise.

While sale or lease of all or part of the Government's enrichment assets could be beneficial, the Department's request for expressions of interest in the enrichment enterprise last year did not result in any entities interested in owning the entire enterprise in the near term. (There was interest in owning some of the assets.) We see no changes in the market since then. The option of maintaining the status quo was rejected since this will likely lead to further deterioration of the enterprise, thus jeopardizing the domestic supply of enrichment services, and the reliability of the U.S. in the eyes of foreign customers.

To achieve the objective of maintaining a competitive uranium enrichment enterprise in the United States, the Department has concluded that the enterprise should be restructured. An independent organization should take over the relevant assets of the Department of Energy uranium enrichment enterprise and carry out in a businesslike, competitive, and profitable manner the commercial uranium enrichment activities now conducted by the Department.

This independent organization would be a federally chartered enrichment corporation empowered to do all the things a private business corporation is normally empowered to do, namely, conduct the business; enter into contracts; buy, sell, assign, pledge, lease, or otherwise acquire and dispose of facilities, inventories, receivables, real estate, contracts, and other assets; borrow money; sell stock and other securities; conduct research and development; acquire patents and license their use. The corporation should be empowered to engage in any and all related businesses such as the manufacture and supply of enrichment equipment and related supplies and relevant aspects of the nuclear fuel cycle.

The new enrichment corporation would acquire all assets of DOE's uranium enrichment business, including plant and equipment, non-defense inventories, licenses, patents, and know-how, including AVLIS. The portion of the Portsmouth facility utilized for production of highly enriched uranium would remain under Federal Government ownership. The corporation would not acquire GCEP. At this time, it is unclear whether the corporation can assume the responsibility for the TVA power contracts, in their present form, and expect to be economically viable.

The ownership of the enrichment corporation should transfer from the Government to the public as soon as possible. While an immediate transfer in ownership might be preferable, the transfer may have to await the resolution of certain issues, such as Nuclear Regulatory Commission (NRC) licensing and regulations and demonstrated financial health. In the interim period, the corporation might be a Government-owned corporation. If a Government-owned corporation is required, then the plan and timetable for becoming publicly owned should be part of its enabling legislation and charter.

The Government would receive convertible preferred stock representing the value of plant and equipment and other assets transferred to the corporation. This preferred convertible stock could pay a fixed dividend and could be sold by the Government to the public who would have the option of converting it to common stock. Thus, the ultimate value of the uranium enrichment facilities would be determined by the actual sale price of the stock when sold by the Government.

As a private corporation, the enrichment corporation would be subject to Federal, state, and local taxes. It would also be subject to regulation by NRC and would require Price-Anderson insurance coverage. The corporation would be subject to materials safeguards and accountability, would be required to protect classified information and technology, and be subject to trade laws and the Nuclear Nonproliferation Act restrictions.

The establishment of this enrichment corporation would resolve many of the problems currently faced by the DOE enrichment enterprise which prevent it from operating efficiently and competitively in the present market and which, if not resolved, could lead to a further deterioration of the enterprise. In particular, this proposal would have the following benefits:

- Allow the uranium enrichment enterprise to operate in a businesslike, competitive, and profitable manner with a clear, well-understood objective.
- Free the enterprise from governmental, budgetary, administrative, personnel and procurement limitations which prevent realistic business planning and operations.
- Permit flexible pricing and contracts, as is done by the competitors, without present restrictions.
- Establish industrial-style management.
- Allow development of advanced technologies based on their importance to future competitiveness.
- Recover as much of the Government's investment in the enterprise as is practicable as determined by the market.
- Provide a climate for the development of competition.

This proposal will also support a number of national objectives which are currently in jeopardy because the current structure and flexibilities of the enrichment enterprise are inadequate in today's marketplace. A strong domestic uranium enrichment enterprise is key to achieving national objectives of supporting domestic civilian nuclear power, contributing to a favorable balance of trade, and retaining a technological edge over our rivals.

Failure to adjust to meet the challenge of fierce international competition could result in the U.S. soon becoming the free world's supplier of last resort. As such, the U.S. enrichment facilities would have to remain in operation, serving only a limited market, while continuing to carry its heavy overhead costs. This would further jeopardize the domestic supply of enrichment services, the recovery of investments in the enterprise, the Nation's balance of trade, employment, and reduction of the Federal deficit.

TENNESSEE VALLEY AUTHORITY
WASHINGTON, D. C. 20444

April 1, 1987

Ms. Cheryl Moss
Senate Committee on Energy and
Natural Resources
312 Hart Senate Office Building
Washington, DC 20510

Dear Cheryl:

Attached you will find the questions submitted March 16, 1987 by Senator Ford to Robert Steffy, Manager of Power, following the March 13, 1987 hearing.

Many thanks for the extension of time. Please call if you need additional assistance in this matter.

Sincerely,

Bill

Willard (Bill) Phillips, Jr.
Assistant Washington Representative

3537A

FORD

Question 1:	Can you explain why DOE's demand charges per megawatt-hour of unused capacity have increased by 35 percent since 1985, while TVA's energy rates for industrial customers have dropped by 19 percent?
Answer:	In setting rates, TVA relies upon the cost-of-service principle—the concept that rates should recover from each class of customer the costs of serving that class. Power supply costs and the proportionate share of those costs involved in serving the different customer classes tend to change over time. TVA periodically performs cost-of-service studies to determine whether changes in the rate structure to reflect these cost trends are appropriate. The most recent cost-of-service study, completed in 1986, showed a number of cost factor changes since the 1982 cost-of-service study, which was the study used in developing the rates in effect between July 1983 and October 1986. Following receipt and consideration of public comments in 1984, TVA revised the cost classification treatment of certain expense items in the study. Moreover, due to substantial investments in generating plants, the cost structure of the TVA system became more fixed during those years. At the same time coal prices declined.

The results of the 1986 study were reflected in the rate changes which became effective in October 1986 for all customer classes. Of course, the increase in DOE's capacity charge was the same as the increase in the demand charge for TVA's other large, directly served customers. Likewise, the energy charge applicable to DOE decreased by the same amount as that applicable for those other customers.

As a result of these changes, directly served customers that elect to use a high proportion of the energy available to them have experienced decreases in their bill even though demand charges have risen. DOE could realize similar benefits if it chose to operate at levels comparable to those projected when it requested TVA to make available the amounts of power set out in the Power Contracts.

FORD

Question 2:	Is anyone else in the TVA system in the same "minimum payment" situation that DOE is in? Can you explain why that might be so?
Answer:	Yes. Thus far in this fiscal year, five of TVA's directly served customers in addition to DOE have similarly had minimum payment obligations. During fiscal years 1980 through 1986 (peaking in 1983 when 33 of TVA's customers were in this situation), a much larger number (27 customers per year on the average) of TVA's directly served industrial and Federal customers made minimum payments.

These situations generally arise as a result of a company making more favorable production projections than later turn out to be the case. On the basis of these projections, such companies, as did DOE, contracted for TVA to make available more electric capacity than they now want to use.

TVA, in reliance on the power contracts, incurs certain fixed costs in order to be able to make available the amounts of power requested by the customer and specified in the contract. In the absence of minimum payment obligations, these costs would unfairly be borne by the other ratepayers of the TVA region if a customer subsequently chooses not to use the power it contracted to be made available.

FORD

Question 3: Does TVA charge for construction work in progress (CWIP) in their general rates? Do they charge DOE for CWIP?

Question 4: Is interest capitalized in the general system rates? Can you show how much interest was recovered in DOE's rates from 1980 through 1987? How much interest do you plan to recover in the next five years?

(Since questions 3 and 4 are closely related, we are furnishing a combined answer.)

Answer: All interest associated with construction work in progress is presently being capitalized. This, however, does not relieve TVA of the specific requirement under one of its bond tests, which is set out in the TVA Act and its Basic Bond Resolution, to obtain revenues each year adequate to cover amounts required to be paid during the year as interest on outstanding borrowings. The prevailing rates applicable for all TVA customers, including DOE, reflect these requirements. Borrowing funds to pay interest, which has been suggested by DOE, would, in addition to being financially imprudent, violate that requirement.

The following table reflects the amount of the demand charge (which is applicable for all large directly served customers, including DOE) attributable to interest obligations on all of TVA's outstanding debt.

	Fiscal Year Amounts
1980	$3.28
1981	4.11
1982	4.88
1983	5.65
1984	5.97
1985	5.97
1986	6.42
1987	7.10

While we are unable to state at this time how much interest expense TVA will have in the next five years, we expect it to increase only moderately in that period.

Question 5: Please explain the two-tier structure of the TVA system rates. How is it that a customer in a demand charge only situation can pay almost as much as a customer who is using TVA energy?

Answer: As is generally true throughout the electric power industry, rates which have been established for serving large loads in the TVA region include (1) a component related to TVA's fixed costs (such as interest and depreciation) on the equipment and facilities required to make power available (this is generally referred to as a demand or capacity charge), (2) a component generally related to those costs (such as fuel) which vary with the amount of energy generated (this is usually referred to as the energy charge), and (3) certain minimum payment, or minimum bill, obligations extending for the term of the contract. Minimum payment obligations assure that TVA will be able to recover at least a portion of the fixed costs incurred in providing facilities necessary to have available the amount of power requested by the customer.

A customer that did not choose to take any of the energy available to it would pay only those minimum payment obligations. (The energy charge is only paid on the specific amounts of electric energy used.) To the extent that the customer began utilizing energy, its bill would begin increasing with each additional kilowatthour taken, and if demand increased sufficiently, minimum payment obligations would no longer apply. Accordingly, a customer operating at a substantial level would always pay considerably more than a customer that has an equal contract demand but is in a shutdown situation. With respect to DOE specifically, DOE's bill would be more than twice its present amount if it were now operating at the level projected when it entered into the Power Contracts.

0791D

FORD

Question 6: Has the system rate structure been changed since 1982?

Answer: In setting rates TVA has historically relied upon the cost-of-service principle, the concept that rates should recover from each class of customer the cost of serving that class. TVA periodically performs cost-of-service studies to determine whether changes in the rate structure to reflect changing cost trends are appropriate.

In fiscal year 1982 TVA completed a cost-of-service study which was used in developing certain rate changes which became effective in July 1983. These changes included a revised treatment at the wholesale and resale level of the allocation of hydropower benefits and a new outdoor lighting rate schedule. Time-of-day rates were also made available to large customers (those with loads greater than 5,000 kW).

In October 1986, as a result of continuing study of various cost factors, further rate changes were implemented utilizing a cost-of-service study completed earlier that year. In performing work preparatory to the 1986 cost-of-service study TVA invited public comment on the cost classification step of the study in the fall of 1984.

After a review of the available cost information, and consideration of the comments received, TVA concluded that, while there should be a change in the treatment of certain expense items, TVA would continue to follow its historical approach with respect to cost classification in completing the cost-of-service study.

Among the items included in the 1986 Rate Change were simultaneous billing of all distributor delivery points at the wholesale level, improved recognition of the coincidence of small general power loads (below 5,000 kW) with distributors' peaks, and a revision of the minimum bill obligations. As a result of this last item, DOE's bills for FY 1987 will be less than they would have been if there had been no change in rate design and TVA had merely increased rates under the old rate structure by the amount sufficient to recover the FY 1987 revenue requirement.

0791D

FORD

Question 7: Has cost allocation within the rate structure been changed since 1982?

Answer: Cost allocation is the step of the cost-of-service study by which the costs are apportioned to the various customer classes. In the FY 1982 cost-of-service study, TVA utilized a demand allocator based upon the average of the summer and winter system peak loads instead of the single annual peak, as had been done previously. Reserve margins on thermal generation capacity were also equalized. The FY 1986 cost-of-service study utilized the same approach to cost allocation as that in the 1982 study.

FORD

Question 8:	How many and which plants do you plan to put on line in the next ten years? How much of the costs of these plants will appear in the DOE rates? When?
Answer:	Within the next ten years TVA expects, based on current projections, to add Watts Bar and Bellefonte Nuclear Plants to the TVA system. However, under the present construction schedule for Bellefonte, its completion will not occur until after power supply to DOE ends in March 1994. Thus, Bellefonte's being put on line should not result in additional costs appearing in rates charged to DOE. While we expect the Watts Bar Nuclear Plant to be placed in service before 1994, plans for completion and operation of the plant are currently under extensive review by NRC and TVA, and no schedule is yet available. TVA projects that, when Watts Bar does come on line, an average increase in rates of approximately 5 percent will be required.

DOMENICI

Question 1: I understand and fully appreciate the nature of your commitment to supply electricity to meet the needs of your customers. However, in view of your current state of affairs, would you even be able to supply 4,485 MW of power to DOE, should they need it? How much of the 4,485 MW could you supply to DOE from your current capacity, and still be able to meet the power requirements of the rest of your customers?

Answer: TVA can supply 4,485 MW of power to DOE and still meet the power requirements of the rest of its customers.

The installed generating capacity for the TVA power system is approximately 32,000 MW. Excluding TVA's nuclear plants, which are temporarily shut down, TVA still has in excess of 26,200 MW of nonnuclear generation available on its system. Moreover, TVA's system, by virtue of investments in system interties and a strong system-wide transmission grid, has the capability of importing thousands of megawatts of power from neighboring electric systems (which are in current excess capacity situations and are actively seeking market opportunities). To put TVA's system capacity situation in perspective, TVA's peak load this past winter was 19,660 MW. (There were, of course, lesser load levels at other times.)

In addition to the above mentioned resources, TVA has other power supply alternatives and options at its disposal which serve to enhance TVA's capability of meeting all its firm loads at peak times. TVA, utilizing one such resource, can exercise contract rights to interrupt delivery of power under a variety of interruptible contracts. This, of course, is available if needed for firm load supply.

DOMENICI

Question 2: How much excess capacity does TVA now have within its system of operating facilities?

Answer: As discussed in the response to question 1, the nonnuclear generating capacity on the TVA system is 6,540 MW higher than the actual system peak of 19,660 MW this winter. This, of course, does not take into account interruption rights that are available or the thousands of megawatts that could be obtained from neighboring systems. Thus, without resorting to any other alternatives to meet firm loads, TVA has been and continues to be able to carry out its power supply responsibilities even assuming DOE's resumption of substantial power takings even up to 4,485 MW.

DOMENICI

Question 3: If DOE were suddenly to require the 4,485 MW of power it has under demand contract with TVA, and TVA could not meet this demand because of forced shutdown of its nuclear plants, would this constitute a "force majeure"—and thus a reason for DOE to get out of the contract?

Answer: TVA does not envision a situation whereby it would be unable to supply DOE's contract demand. As indicated in the answer to Question number 1, TVA can supply up to 4,485 MW of power to DOE and still meet the power requirements of its other customers. Of course, the force majeure provisions do not provide a basis for DOE's getting out of the contracts, even assuming they were to become applicable because of some unforseen circumstances.

DOMENICI

Question 4: If DOE could not pay for the TVA demand charges because of a significant loss of business (and thus a loss of revenues), would this constitute a "force majeure"—and thus a reason for DOE to get out of the contract?

Answer: No. A significant loss of business does not constitute a force majeure occurrence under the power contracts. To the contrary, potential business reversals are among the reasons why the minimum payment provisions have been specifically included in these contracts, as well as those with other large customers served by TVA. To do otherwise would result in improperly shifting costs to other ratepayers when power takings of business operations, for whatever reason, fall below the level where minimum payment obligations apply.

DOMENICI

Question 5: I am not familiar with TVA's accounting principles, but bear with me while I draw the following parallel:

In determining what DOE's obligation was with respect to its debt, the Department wrote off $4 billion for those enrichment facilities that were shut down or terminated (i.e., the Oak Ridge diffusion plant, a portion of the Paducah and Portsmouth plant capacity, and all of the investment in GCEP).

Let me translate this to TVA's situation, where certain nuclear power plants were cancelled. Wouldn't a "write-off" of these TVA plants be similar in terms of accounting principles to what DOE has done in "writing off" its cancelled enrichment facilities? Yet, instead of choosing this option, it appears to me that you are still carrying these cancelled plants on the books, and that you intend to recoup a portion of your investment in these cancelled plants by continuing to insist on collecting demand charges from DOE that no longer reflect the reality of the situation. Are my interpretations correct?

Answer: These situations both involve the recognition of a loss in asset value through the operating results of the enterprise. However, due to differences in the nature of the two enterprises and the way in which they have been capitalized, the effects are quite different.

As we understand the DOE enrichment program, its liabilities are essentially all in the form of U.S. Government appropriations. Since the operation is wholly owned by the U.S. Government, this means that its capitalization is all paid in capital by its owner. Thus, a loss in asset value results in nothing more than the owner adjusting downward the value of its investment. TVA is also wholly owned by the U.S. Government, but its liabilities are structured in a manner that is considerably different from those of DOE. In the TVA power program case, the U.S. Government's equity consists of two pieces—Congressional appropriations ($0.8 billion) and retained earnings reinvested ($2.0 billion), both at September 30, 1986. By far, the greatest portion of TVA's capitalization (over $17.0 billion) is debt.

The TVA Act contains provisions, which are also included in the binding covenants with lenders, that set limits on the changes that can occur in TVA's retained earnings reinvested over particular five-year periods. TVA did reduce its accumulated retained earnings by a total of $1.2 billion as a result of the cancellations. (In view of the requirements set out in the TVA Act and the Basic Bond Resolution, additional losses were not recognized at that time.) However, consistent with generally accepted accounting principles applicable for such electric system operations, the remaining amounts are recognized as assets and are being written off over a period of years. These accounting principles have been widely followed by electric utilities, particularly with respect to the cancellation of nuclear plants.

As to the other portion of the U.S. Government's equity in the TVA power program (the Congressional appropriations) the TVA Act sets out how that is to be handled through a series of annual payments covering return on the appropriations investment and repayments on that investment. In effect, the provisions of the TVA Act, as well as those of the Basic Bond Resolution, were written to protect both the bondholders' investment and the Congressional appropriations.

DUKE POWER COMPANY
P. O. Box 33189
CHARLOTTE, N. C. 28242

WILLIAM S. LEE
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PRESIDENT &
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April 3, 1987

Senator Wendell H. Ford
Chairman, Subcommittee on Energy
Research & Development, Committee
on Energy & Natural Resources
United States Senate
Washington, D. C. 20510

Dear Senator Ford:

It was a pleasure to appear before the Subcommittee on Energy Research and Development on March 13, 1987 to discuss the Department of Energy's uranium enrichment program and related uranium issues. Attached is my response to questions provided by you and your colleagues as a follow-up to that hearing.

I continue to support the efforts of you and your colleagues to develop comprehensive legislation to address the issues associated with uranium enrichment, uranium supply and uranium mill tailings. It is especially critical that the uranium enrichment program be restructured and the unrecovered cost issue be resolved this year! Lawrence Livermore National Laboratory has recently estimated that enrichment costs for EURODIF and URENCO are $70-75/SWU, at current exchange rates. Thus, prolonging the uncertainty surrounding the enrichment program's commitment and ability to offer competitive services will leave Duke Power, and other electric utilities, with no alternative but to obtain uranium enrichment services from lower cost suppliers.

In closing, it is important to note that electric utilities have an obligation to their customers to provide an adequate, reliable source of electricity at a reasonable price. Therefore, as we work together to resolve the current uranium issues, we should strive for a comprehensive policy that will benefit both the country and the electric utility customer, thereby, strengthening the ability of American industry to compete effectively in the world marketplace.

Sincerely,

WSLee

William S. Lee

FGH:scs

Attachment

FOLLOW-UP QUESTIONS

HEARING ON DOE'S URANIUM ENRICHMENT PROGRAM

QUESTIONS FOR BILL LEE

FROM SENATOR WENDELL FORD

March 13, 1987

1. How much natural and enriched uranium inventory do the utilities currently hold? What is the origin of the uranium in the inventory?

ANSWER:

According to DOE/EIA data, at the end of 1985, utilities held in inventory uranium totalling 153.8 million pounds (U_3O_8 equivalent) of which 115.9 million pounds were of domestic origin and 37.9 million pounds were of foreign origin.

2. Please explain the assumptions and methodologies used in arriving at the following so-called debt figures for the uranium enrichment program:

(a) $370 million.

(b) zero "debt".

ANSWER

The $350 million figure was developed by using a method that compares the expenditures which the Federal government made in providing uranium enrichment services with the revenues paid by the customers for those services. Using this approach, the total program expenditures over the period from 1969 through 1984 were $14,880 million; but this amount includes production costs of $1,430 million that should have been allocated to defense enrichment, leaving a balance for civilian customers of $13,450 million. During this period, total civilian revenues were $13,320 million leaving a net balance of $130 million of civilian expenditures in excess of civilian revenues.

Since these expenditures occurred in different years over the sixteen year period, it may be appropriate to apply an imputed interest value on the net yearly expenditure excess. Such an imputed interest value appears to be about $220 million. The sum of the $130 million civilian expenditure excess, and the imputed interest thereon of $220 million, totals $350 million for net civilian expenditure excess plus interest.

The approach described above actually overstates the real civilian deficit for providing enrichment services to commercial customers. It does not recognize that an additional portion of the $13,450 million should have been allocated to defense as a cost of safeguarding highly enriched uranium. Additionally, no allocation of the $13,450 million was made to account for the government's non-proliferation/national security policies.

If these two factors are taken into account, then the net $130 million which remained in the above calculation would actually be zero or a negative amount. Therefore, no debt exists, and, more than likely, the commercial customers in fact have subsidized Federal government programs.

3. What are typical utility practices with respect to construction work in progress (CWIP)? What CWIP is Duke Power able to recover in its rate base? How does recovering CWIP in the rate base affect the level of your power rates while the plant is under construction and when it is put into service?

ANSWER:

Thirty four states allow electric utilities to earn a cash return on some construction work in progress (CWIP). The amount of CWIP that is included in rate base differs from commission to commission and even within commissions, from utility to utility. Generally, CWIP for pollution control and major generating units are more likely to be included in rate base than other CWIP. Utilities with some financial stress are also more likely to be allowed CWIP in rate base.

Currently, the Federal Energy Regulatory Commission (FERC) allows CWIP on pollution control and coal conversion equipment to be included in rate base. The FERC also allows 50% of all other CWIP to be included in rate base. This is a matter currently before the courts, so it could change.

The term CWIP in rate base means the allowance of a cash return on CWIP. For example, some states allow CWIP in rate base but also include allowance for funds used during construction (AFDC) in return. An annualized inclusion of AFDC in return would effectively nullify the inclusion of CWIP in rate base. However, inclusion of something less than an annualized amount of AFDC effectively allows a partial inclusion of CWIP in rate base.

Duke Power does not currently include CWIP in rate base in any of its three jurisdictions. The North Carolina Utilities Commission (NCUC) allows CWIP to be included in rate base under certain fairly strict circumstances. In the past, Duke Power has had some CWIP in rate base in North Carolina on a temporary basis. The Public Service Commission of South Carolina (PSCSC) has never allowed CWIP in rate base for Duke Power. Duke Power has never included any CWIP in rate base under rates regulated by the FERC.

During the time CWIP is included in rate base, rates are generally higher than they would otherwise be. Once the plant is placed into service, rates are lower than they would otherwise be. Overall, in both nominal dollars and in present value, aggregate rates are lower with CWIP in rate base than they would otherwise be. The reasons are as follows. First of all, CWIP in rate base is a pay-me-now or pay-me-later concept. The costs that are being billed to the customer with CWIP in rate base would otherwise be capitalized, become part of the cost of the plant, and recovered, with interest and return, over the service life of the plant after it goes into service.

Thus, the difference is merely one of timing. Secondly, CWIP in rate base improves cash flow to the utility. An improved cash flow to the utility reduces the cost of capital which reduces rates to the customer. Thirdly, CWIP in rate base reduces the cost of the plant and therefore reduces property taxes for its lifetime.

4. Is Duke Power able to unilaterally restructure its rates and/or reallocate between fixed and variable costs in its rate base when they feel that it is necessary?

ANSWER:

No. Nor can Duke Power unilaterally change rates in order to shift the emphasis from fixed to variable costs or vice versa. If such a change is desired, a case must be presented to the regulatory commissions, and after holding public hearings, the commissions decide.

FOLLOW-UP QUESTIONS
HEARING ON DOE'S URANIUM ENRICHMENT PROGRAM
QUESTIONS FOR BILL LEE
FROM SENATOR PETE DOMENICI
March 13, 1987

1. In 1984, you participated in the Tri-Committee Panel that recommended a restructuring of DOE's enrichment business. In a draft of the bill I sponsored last year (S. 1004), there was a section dealing with reorganization of the enrichment business into a quasi Government/private corporation. I would like to provide you with a draft of that original proposal, and I'd appreciate your comments. I have a feeling that your ideas and mine may be very much along the same lines.

ANSWER:

The referenced draft legislation does indeed embody the spirit of the Tri-Committee Panel's findings and recommendations. Specifically, the legislation mandates competitive pricing and institutes an organizational structure that allows the enrichment enterprise to function in a more business-like manner. Such a structure will allow the enterprise to better serve the needs of uranium enrichment customers, develop and implement long range business and marketing plans, conduct necessary R&D activities, access the financial market for investment capital, provide a source of revenue to the Federal government, and effectively compete in the world marketplace. Therefore, the draft legislation appears to be a very reasonable vehicle for reorganization and a prudent step towards the possibility of eventual privatization. Detailed comments are provided below.

Detailed Comments

Section 403(a)(2)(A), pg. 2

The first line should be revised to read "The chairman and two other directors with appropriate business experience..." As concluded by the Tri-Committee Panel, it is imperative that individuals with industrial business experience and skills be available to the Corporation in a leadership capacity. This is especially critical during the Corporation's formative years. This revision will assure that the necessary business leadership is initially present.

Section 405(b)(5), pg. 6

Delete the last two lines and insert the words "...except security-related information or information deemed confidential by the Corporation". This revision provides the authority to withhold from public release information that would hinder the Corporation's ability to effectively compete and is consistent with standard corporate business practices.

Section 405(e), pg. 6

The following sentence should be added to the end of Section 405(e): "The specificity and detail of information to be provided shall be consistent with current standard business practices in Federal and public filings". This will assure that annual reports and other public documents do not contain information that will hinder the Corporation's ability to effectively compete.

Section 408(a)(2), pg. 9
The reference to the Uranium Enrichment Corporation should be changed to Enrichment Services Corporation. This is consistent with Section 402(e).

Section 408(a)(2) pg. 9
The words "in the following phrase and beyond" should be inserted in the second line following the phrase "deleting the words." This revision removes the uranium industry viability and enrichment criteria requirements from Section 161(v) of the Atomic Energy Act of 1954, as ammended. The former is appropriate since the enrichment program restructuring is one part of a comprehensive legislative package that also addresses the issue of a strengthened domestic uranium production capability. The latter is appropriate since the enrichment criteria are a definition of contractural terms and conditions. This is commercially sensitive information whose public availability will hinder the Corporations's ability to effectively compete.

Section 408(b)(1), pg. 9
Revise the last 2 1/2 lines to read "and a return on the investment of the holders of the preferred stock of the Corporation, or as otherwise

determined by the Board." This revision provides the Board with the flexibility to temporarily operate at a loss when deemed to be in the longterm best interest of the Corporation. This authority is consistent with that of other U.S. corporations.

Section 408(b)(3), pg. 9
Section 408(b)(3) should be deleted. The periodic publication of the Corporation's price list will place it at a competitive disadvantage.

Section 409(b), pg. 10
The word "annually" should be deleted. This revision will provide the maximum flexibility to the Corporation and the Secretary of Energy to negotiate an access and usage agreement that is in the best interest of both parties.

Section 410(b), pg. 11
The reference to the Uranium Enrichment Corporation should be changed to Enrichment Services Corporation. This is consistent with Section 402(a).

2. I'm glad that you agree with me that a viable domestic supply of uranium is in the long-range interest of electricity customers. Yet, I was quite interested in your alternative approach to achieve that end. You propose that we match sales of domestic uranium with uranium from the U.S. stockpile, and thereby drive down the average cost per pound. Could you elaborate on this proposal for the benefit of the Members? Are there any downsides to this proposal, as compared to

import restrictions? Is this similar to the PIK (payment-in-kind) program carried out for the benefit of farmers? Do you think this proposal would be more acceptable to the Administration than import restrictions?

ANSWER:

Should Congress desire to provide assistance to the uranium industry, it should be done in a manner which will not drive up the cost of electricity and, consequently, affect the ability of many other domestic industries to compete in the world market. In order to maintain a certain share of the uranium market for domestic producers without unduly penalizing the utilities, a program that uses DOE uranium stockpile to boost domestic sales deserves a closer look.

Currently, EIA estimates that DOE owns 110,000,000 pounds of U_3O_8. The stockpile has existed since the early 1960's, and the government paid approximately $9 per pound for a total cost of $990 million. From the electric utility perspective, DOE has three options with the stockpile:

1. The stockpile may be used as overfeed material for the uranium enrichment plants. This is the current practice of DOE in an effort to offset the cost of enrichment.

2. The stockpile could be sold as part of the Administration's Asset Divestiture Program. It should be attractive to the

administration in that it will generate revenue to the Treasury as part of the effort for budget deficit reduction, and, more importantly, it will reduce the carrying costs which in turn will reduce the cost of SWUs sold to commercial customers.

3. DOE can maintain the stockpile by doing nothing. Utilities would then, as in the past, continue to pay the carrying costs of the entire stockpile.

It seems only logical that DOE should dispose of the stockpile in a manner which can optimize a return to the Treasury, reduce the price of SWUs and benefit the mining industry in the process.

EIA estimates that the total uncommitted domestic uranium market will be 10 million pounds of U_3O_8 in 1988. Most likely, the U.S. utilties will fill that uncommitted need by buying short term or on the spot market. Presently, the spot market prices are \$17-\$20 per pound and the domestic suppliers are selling uranium for about \$27 per pound. If the federal government would sell the stockpile to the U.S. producers at acquisition costs (about \$9 per pound) for each pound of uranium actually mined and milled in the U.S., then U.S. produced uranium can be sold competitively by averaging the cost of newly produced uranium and the cost of uranium from the stockpile.

If U.S. utilities buy the additional uncommitted 10 million pounds of uranium from the domestic producers, who under this incentive program would have to increase production for an additional five million pounds of uranium, the domestic share of the market would increase to 43% in 1988 and to 52% in 1999. The attached figure of "Projected U.S. Uranium Production" prepared by EIA, shows that the level of domestic production between now and 1990 will drop from 34% (11.5 million lbs) to 28% (9.5 million pounds) of the domestic market. From 1990 to 1993, the mean domestic production will remain essentially level and then increase gradually to 38% (12.8 million pounds) in 1999.

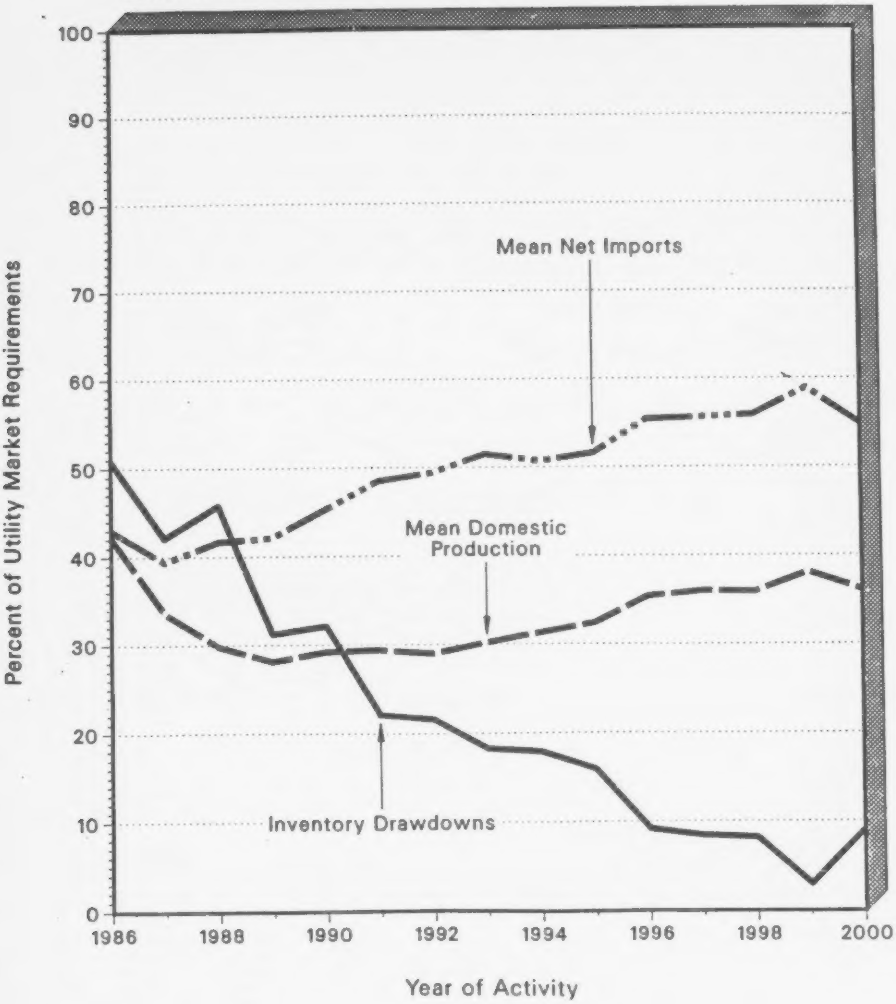
Under the stockpile scenario, 50% of domestic market share can be achieved without imposing an import restriction which runs against the administration's free trade policy with our friendly allies. With DOE's 110,000,000 pounds of U_3O_8, a five million pounds per year disposition of the stockpile can continue for more than 20 years, well beyond the 12 year embargo period that the producers have claimed necessary in order to be competitive again. Indeed, under this program, the producers can boost their revenues an additional $135 million and the Treasury would receive $45 million per year.

As far as any downsides to this proposal as compared to import restrictions, from the utilities' point of view, there are none. While the producers may claim that this program would flood the market and further depress it, in actuality the only downside from their point of view could be that under this program, actual production may not be as great as it might be with an import restriction. One important point with an import restriction, however, is that electricity costs would go up to pay for the additional nuclear fuel costs. An import restriction that would cause a price increase of approximately $10 per pound would cost the electric utilities approximately $2 billion. The stockpile program is a balanced approach conceived in the spirit of developing comprehensive legislation to deal with all the problems confronting the nuclear fuel cycle.

As to the similarity between this proposal and the payment-in-kind (PIK) farm program, the mechanism may be alike, but the similarity stops right there. This uranium stockpile program would encourage the additional production of uranium by domestic producers beyond the long term contracts requirement, while PIK provides alternative means of a payment under the farm program in compensation for reducing farm production.

Finally, the uranium stockpile program will provide revenue to the U.S. Treasury without placing a burden on the U.S. enrichment enterprise nor having an adverse impact on the long term stability of the nuclear industry as a whole. It is therefore a policy the administration must consider.

Projected U.S. Uranium Production, Net Imports, and Inventory Drawdowns as a Percentage of Utility Market Requirements: Lower Reference Case



Domestic Uranium Mining and Milling Industry: 1985 Viability Assessment
Energy Information Administration

APPENDIX III

Additional Material Submitted for the Record

CHAIRMAN

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

to - Ben Cooper
20yr

April 16, 1987

The Honorable Wendell H. Ford, Chairman
Subcommittee on Energy Research and Development
Committee on Energy and Natural Resources
United States Senate
Washington, D.C. 20510

Dear Mr. Chairman:

Thank you for your letter of March 10, 1987 regarding data and cost estimates relating to uranium mill tailings reclamation. The material presented to your Subcommittee by letter dated September 8, 1986 included NRC staff editing based on information available as of September, 1986.

The NRC staff has reviewed this material and updated the report to reflect data as of March 1, 1987 (Enclosure 1). In addition, an explanation of the process by which this data has been developed is provided as Enclosure 2.

We appreciate the opportunity to provide this updated material for inclusion in the record of your Subcommittee hearing.

Sincerely,

Lando W. Zech, Jr.

Lando W. Zech, Jr.

Enclosures:
1. Briefing Paper
2. The NRC Sources of Information
   for Updating The GAO Report

BRIEFING PAPER*

ANSWERS TO QUESTIONS IN PREPARATION FOR A HEARING ON THE PROPOSED "URANIUM MILL TAILINGS RECLAMATION ACT"

MARCH 1987

*THIS DOCUMENT WAS PREPARED BY THE NRC STAFF AS AN UPDATE TO THE GAO STAFF BRIEFING PAPER TO ASSIST THE SUBCOMMITTEE ON ENERGY AND ENVIRONMENT, HOUSE COMMITTEE ON INTERIOR AND INSULAR AFFAIRS PREPARE FOR A HEARING ON TWO BILLS. IT IS BASED ON THE MOST CURRENT READILY AVAILABLE INFORMATION. ALL PAGES WERE REVISED TO REFLECT THE NRC'S CURRENT INFORMATION ON THE MILL LICENSEES (AS OF MARCH 1, 1987).

ENCLOSURE 1

FOREWORD

This report is an NRC-prepared modification of a July, 1985 GAO Briefing Paper. Changes from the original GAO version are indicated by vertical bars in the margin space.

In September 1986, an NRC-prepared markup of the GAO report was provided to the Subcommittee on Energy Research and Development of the Committee on Energy and Natural Resources. This NRC modification further updates and formalizes the changes to the GAO report previously provided by the markup.

These revisions reflect information available as of March 1, 1987. The major reasons for the changes are revisions to the status of licensed facilities, amounts of waste tailings produced, and amounts of existing financial surety arrangements to assure adequate funds for site closure and long-term surveillance.

The sureties for the New Mexico licensees are those held by the State of New Mexico which were in effect prior to that program's return to NRC on June 1, 1986 and are based on the State requirements which were not fully compatible with the NRC requirements. The NRC staff is currently updating reclamation plans, including the sureties, for 11 facilities. This includes four of the five New Mexico mills. (The remaining New Mexico mill has not yet submitted a revised reclamation plan for review.) The NRC staff expects the surety amounts to increase for the majority of these sites currently under review.

QUESTIONS ADDRESSED IN THIS PAPER

- HOW MANY "ACTIVE" URANIUM MILL SITES ARE THERE?
- WHAT VOLUME OF URANIUM MILL TAILINGS HAS BEEN GENERATED BY FEDERAL AND COMMERCIAL URANIUM PURCHASES?
- WHAT ARE THE ESTIMATED COSTS OF RECLAIMING THE MILL TAILINGS?
- WHO IS LIABLE FOR RECLAIMING URANIUM MILL TAILINGS?
  - --ARE CURRENT OWNERS LIABLE?
  - --ARE PARENT COMPANIES OR OWNERS LIABLE?
  - --DO COMPANIES HAVE FINANCIAL RESOURCES TO PAY CLEANUP COSTS?
  - --CAN THE EPA SUPERFUND BE USED TO FINANCE CLEANUP ACTIVITIES?
- ARE THERE IMPORTANT ISSUES RAISED BY THE SUBJECT BILLS DESERVING OF CONGRESSIONAL CONSIDERATION?
  - --FINANCIAL PROVISIONS
  - --FEDERAL/STATE RELATIONSHIPS

ACTIVE[a] URANIUM MILLS

	NUMBER OF MILLS
REGULATED BY THE NUCLEAR REGULATORY COMMISSION	
--SOUTH DAKOTA	1
--UTAH	4
--WYOMING	9
--NEW MEXICO[b]	7
	21
REGULATED BY STATES	
--COLORADO	4[c]
--TEXAS	3
--WASHINGTON	3
	10
TOTAL	31

PAGE 13 LISTS THE ACTIVE URANIUM MILL LICENSEE LOCATIONS, THE PARENT COMPANIES OF MILL LICENSEES (WHERE APPLICABLE), AND THE CURRENT STATUS OF EACH MILL.

[a] AS DEFINED IN S. 1004 AND H.R. 2236, ACTIVE URANIUM MILLS INCLUDE MILLS WITH LICENSES IN EFFECT ON OR AFTER JANUARY 1, 1978.

[b] NRC REASSERTED REGULATORY AUTHORITY IN NEW MEXICO AT THE REQUEST OF GOVERNOR ANAYA. THE EFFECTIVE DATE WAS JUNE 1, 1986. THE NRC IS PROCEEDING TO BRING THE NEW MEXICO MILLS INTO COMPLIANCE WITH THE FEDERAL STANDARDS INCLUDING COMPLIANCE WITH THE SURETY REQUIREMENTS.

[c] TWO OF THE COLORADO LICENSEES ARE HEAP-LEACH OPERATIONS AND ARE INCLUDED IN THIS REPORT DUE TO THE MODERATE VOLUME OF TAILINGS AT THE TWO SITES.

WHAT VOLUME OF MILL TAILINGS HAS BEEN GENERATED BY FEDERAL AND COMMERCIAL URANIUM PURCHASES?

MILLS REGULATED BY	VOLUME GENERATED BY[a] FEDERAL CONTRACTS	COMMERCIAL CONTRACTS	TOTAL
	--(MILLIONS OF SHORT TONS[b])--		
NRC	48.8	122.5	171.3
STATES	7.1	27.0	34.1
TOTAL	55.9	149.5	205.4
PERCENT OF TOTAL	27.2%	72.8%	100.0%

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[a] DATA AS OF MARCH 1, 1987

[b] 1 METRIC TON IS EQUAL TO 1.102 SHORT TONS (2,000 LBS.)

SEE PAGE 14 FOR VOLUMES OF MILL TAILINGS BY MILL.

SUMMARY OF CURRENT SURETY AMOUNTS FOR URANIUM MILL TAILINGS RECLAMATION[a]

MILL LOCATIONS	NUMBER OF MILLS	EXISTING VOLUME (MILLIONS OF SHORT TONS)	CURRENT SURETY AMOUNTS (MILLIONS)	COST PER TON
NRC LICENSED				
SOUTH DAKOTA	1	3.6	$ -[b]	$ -
UTAH	4	16.2	6.5[b]	0.40
WYOMING	9	65.4	53.0	0.81
NEW MEXICO	7	86.1	34.6	0.40
SUBTOTAL	21	171.3	94.1	0.55[c]
STATE LICENSED				
COLORADO	4	15.2	52.0	$ 3.42
TEXAS	3	13.7	15.5	1.13
WASHINGTON	3	5.2	7.0	1.35
SUBTOTAL	10	34.1	74.5	2.18[c]
TOTAL	31	205.4	168.6	0.82[c]

SEE PAGE 15 FOR RECLAMATION SURETY AMOUNTS BY MILL.

[a] RECLAMATION INCLUDES DECOMMISSIONING MILL BUILDINGS, STABILIZING THE TAILINGS PILE, AND CLEANUP OF ANY WINDBLOWN TAILINGS. MOST OF THE EXISTING SURETY ARRANGEMENTS OR COST ESTIMATES DO NOT INCLUDE GROUNDWATER RESTORATION FROM TAILINGS SOLUTION CONTAMINATION.

[b] SEE FOOTNOTES ON PAGE 16.

[c] WEIGHTED AVERAGE.

URANIUM MILL TAILINGS RECLAMATION RESPONSIBILITY

- CURRENT LICENSEES (LICENSED AND REGULATED BY NRC OR STATES) ARE LIABLE FOR RECLAIMING MILL TAILINGS PILES IN COMPLIANCE WITH EPA GENERAL ENVIRONMENTAL STANDARDS AND NRC/STATE REGULATIONS.

  NRC AND STATES REQUIRE LICENSEES TO ESTABLISH SURETY ARRANGEMENTS TO COVER RECLAMATION COSTS. OF THE 29 MILLS THAT HAVE GENERATED MILL TAILINGS, 26 HAVE HAVE ESTABLISHED SOME FORM OF SURETY ARRANGEMENT. THE REMAINING TWO MILLS WERE LICENSED FOR CONSTRUCTION AND ONE WAS NEVER BUILT AND THE OTHER WAS BUILT BUT NEVER OPERATED. (SEE PAGES 15 THRU 19 FOR DETAILS).

- BECAUSE THE TENNESSEE VALLEY AUTHORITY IS A GOVERNMENT AGENCY, NRC IS NOT REQUIRING TVA TO ESTABLISH SURETY AGREEMENTS FOR RECLAMATION OF THE EDGEMONT, S.D., MILL.

- PARENT COMPANIES OF MILL OWNERS ARE LIABLE FOR RECLAMATION OF MILL TAILINGS PILES IF SPECIFIC ARRANGEMENTS, CALLED CORPORATE GUARANTEES, HAVE BEEN MADE.

  THIS HAS OCCURRED AT 7 OF 25 MILLS FOR WHICH SUBSIDIARY/PARENT COMPANY RELATIONSHIPS EXIST (SEE PAGES 15 THRU 19).

- EPA SUPERFUND MONEYS CAN BE USED TO PAY FOR RECLAMATION OF MILL TAILINGS. IT SHOULD BE NOTED THAT IN A FEDERAL REGISTER NOTICE ISSUED ON SEPTEMBER 8, 1983 (48 FR 40658) THE EPA MADE THE FOLLOWING POLICY STATEMENT: "EPA HAS CHOSEN NOT TO LIST RELEASES OF SOURCE, BYPRODUCT AND SPECIAL NUCLEAR MATERIAL FROM ANY FACILITY WITH A CURRENT LICENSE ISSUED BY THE NRC ON THE GROUNDS THAT THE NRC HAS FULL AUTHORITY TO REQUIRE CLEANUP OF RELEASES FROM SUCH FACILITIES." WITHOUT A CHANGE TO THIS EPA POLICY IT DOES NOT APPEAR THAT FUNDS FOR CLEANUP OF MILL TAILINGS WOULD BE AVAILABLE TO THOSE SITES LICENSED BY THE NRC.

  FOUR MILLS ARE ON THE EPA SUPERFUND NATIONAL PRIORITY LIST. THEY ARE:

  - CANON CITY, CO (COTTER CORPORATION)
  - URAVAN, CO (UMETCO MINING COMPANY)
  - CHURCHROCK, NM (UNITED NUCLEAR CORPORATION)
  - GRANTS, NM (HOMESTAKE MINING COMPANY)

THE CHURCHROCK AND GRANTS MILLS WERE LICENSED BY NEW MEXICO WHEN THEY WERE PLACED ON THE NATIONAL PRIORITY LIST. HOWEVER, THESE TWO MILLS ARE NOW LICENSED BY NRC. NRC IS WORKING WITH EPA TO ENSURE THAT THERE IS PROPER FEDERAL COORDINATION FOR THE NEW MEXICO SITES.

URANIUM MILL LICENSEE FINANCIAL SURETY ARRANGEMENTS[a]

- FINANCIAL SURETY ARRANGEMENTS FOR URANIUM MILLS GENERALLY INVOLVE A COMBINATION OF LEGAL COMMITMENTS, AND/OR FINANCIAL INSTRUMENTS.

- SOME MILL OWNERS SIGN A CONTRACT OR OTHER LEGAL DOCUMENT WITH A GOVERNMENT (KNOWN AS AN OWNER GUARANTEE) COMMITTING THEM TO PAY SITE CLEANUP COSTS. A CORPORATE GUARANTEE IS A SIMILAR COMMITMENT SIGNED BY AN OFFICIAL OF THE MILL OWNER'S PARENT COMPANY.

- OTHER ARRANGEMENTS INCLUDE (1) ESCROW ACCOUNTS, (2) SURETY BONDS ISSUED BY AN INSURANCE OR BONDING COMPANY TO COVER EXPECTED RECLAMATION COSTS, AND (3) LETTER OF CREDIT ISSUED TO NRC OR A STATE GUARANTEEING THAT A BANK WILL HONOR THE BEARER'S REQUEST FOR SPECIFIED AMOUNT SHOULD THE MILL OWNER DEFAULT. (SEE PAGES 17 THRU 19 FOR THE TYPE, AMOUNT, AND PURPOSE OF EACH MILL'S FINANCIAL SURETY ARRANGEMENTS.)

- THE CURRENT SURETY ARRANGEMENTS[a] ARE:

-- CORPORATE GUARANTEES	7
-- LETTERS OF CREDIT	7
-- SURETY BONDS	6
-- OWNER/LICENSEE GUARANTEE	3
-- OTHERS	3

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[a] ALL OF THESE SURETY ARRANGEMENTS ARE TO INSURE THAT THERE WILL BE FUNDS FOR RECLAMATION IF THE LICENSEE DEFAULTS ON ITS LICENSE COMMITMENTS TO PERFORM TAILINGS RECLAMATION.

URANIUM MILL COMPANIES' FINANCIAL RESOURCES

- THE FISCAL YEAR 1984 CONSOLIDATED FINANCIAL STATEMENTS OF THE 12 COMPANIES WITH THE LARGEST VOLUMES OF URANIUM MILL TAILINGS (INCLUDING 4 MILL OWNERS AND 8 PARENT COMPANIES OF MILL OWNERS) SHOWED THAT:
  - ASSETS RANGED FROM \$3 MILLION TO \$63.3 BILLION.
  - NET INCOMES VARIED FROM A LOSS OF \$300,000 TO A PROFIT OF \$5.5 BILLION. (SEE PAGE 20 FOR DETAILS.)
- SEVEN OF THE PARENT COMPANIES HAVE EXECUTED CORPORATE GUARANTEES COMMITTING THE CORPORATIONS TO PERFORM RECLAMATION OR PAY RECLAMATION COSTS IF THE SUBSIDIARY DOES NOT HAVE THE FINANCIAL CAPABILITY TO PERFORM RECLAMATION.

(REPLACES PAGE 8 OF THE
REPORT)

FINANCIAL PROVISIONS OF S.1004 SUBSTITUTE LEGISLATION: AMENDMENT NO. 1729 URANIUM REVITALIZATION AND TAILINGS RECLAMATION ACT OF 1986

INTRODUCED BY SENATOR DOMENICI (NM) APRIL 8, 1986

- VOLUNTARY AND TARIFF-LIKE IMPORT RESTRICTIONS REDUCING THE AMOUNT OF IMPORTED URANIUM FOR CIVILIAN POWER GENERATORS TO LESS THAN 50%.

- ESTABLISHMENT OF A FUNDING MECHANISM: "THE URANIUM MILL TAILINGS FUND" (UMTF), TO PROVIDE THE NECESSARY FUNDING FOR RECLAMATION OF COMMERCIALLY LICENSED URANIUM MILLING SITES.

- CONTRIBUTIONS TO THE UMTF ARE STIPULATED BY EXPLICIT FORMULAS IN THE PROPOSED LEGISLATION TO RESULT IN THE FOLLOWING BREAKDOWN OF PERCENTAGES:

FEDERAL GOVERNMENT	30%
URANIUM ACTIVE SITE OWNERS OR LICENSEES	30%
CIVILIAN NUCLEAR POWER REACTORS	30%
STATES (ONLY THOSE STATES WITH ACTIVE URANIUM SITES WITHIN THEIR BORDERS WOULD PARTICIPATE)	10%
TOTAL	100%

- FEDERAL GOVERNMENT CONTRIBUTIONS ARE IN THE FORM OF REVENUES GENERATED BY THE REORGANIZATION OF THE DOE URANIUM ENRICHMENT PROGRAM INTO A MIXED GOVERNMENT/PRIVATE CORPORATION.

- CIVILIAN NUCLEAR POWER REACTOR'S CONTRIBUTIONS ARE IN THE FORM OF A FEE OF $22.00/KG OF URANIUM LOADED INTO EACH REACTOR AND IN THE FORM OF ANY TARIFFS FOR EXCEEDING THE 50% LIMIT FOR IMPORTED URANIUM ($500/KG ABOVE THE 50%).

- MILL LICENSEES AND THE STATES CONTRIBUTE A FEE PER DRY TON OF TAILINGS AT EACH SITE:

URANIUM MILL LICENSEES: $2,000,000 and $1.00 PER DRY TON
STATES : $0.50 PER DRY TON

- THE TOTAL OF ALL CONTRIBUTIONS INTO THE UMTF IS EXPECTED TO BE ONE BILLION DOLLARS. FEDERAL GOVERNMENT APPROPRIATION IS AUTHORIZED TO BE $350,000,000 WITHOUT ANY U.S. TREASURY APPROPRIATION.

- THE PROPOSED LEGISLATION STIPULATES THE UMTF PARTICIPATION BY THE MILL LICENSEES AS BEING THE ONLY FORM OF FEDERALLY IMPOSED FINANCIAL LIABILITY OR OBLIGATION IN CONNECTION WITH RECLAMATION OF ACTIVE MILLING SITES.

(REPLACES PAGE 9 OF THE REPORT)

ISSUES RAISED BY SUBSTITUTE LEGISLATION:

- THE PROPOSED LEGISLATION IS IN CONFLICT WITH THE PRESENT FINANCIAL SURETY PROVISIONS FOR RECLAMATION ACTIVITIES UNDER THE UMTRCA OF 1978, AS AMENDED, AND WITH THE ATOMIC ENERGY ACT. SPECIFICALLY, ACTIVE MILLING SITES APPEAR TO HAVE NO SUCH OBLIGATIONS, IF THEY CHOOSE TO PARTICIPATE (OR EVEN NOT PARTICIPATE) IN THE UMTF.

- THE NRC'S ROLE IN APPROVING THE LICENSEE RECLAMATION PLANS HAS BEEN OBSCURED BY GIVING THE LICENSEE THE POWER TO SELECT AND PERFORM THE REMEDIAL ACTION (SEC. 211) AND BY GIVING DOE BROAD REGULATORY POWERS IN THE AREA OF RECLAMATION (SEC. 223), WHICH ARE NRC'S UNDER UMTRCA (SEC. 203).

- OTHER URANIUM RECOVERY OPERATIONS MAY OR MAY NOT BE ABLE TO PARTICIPATE IN THE UMTF. THE PROPOSED LEGISLATION IS NOT CLEAR IN THIS REGARD.

ACTIVE URANIUM MILLS

OWNER/LOCATION	PARENT COMPANY	MILL STATUS
LICENSED BY NRC		
TVA-EDGEMONT (SD)		DR (04/83)
UMETCO (UT)	UNION CARBIDE CORPORATION	OP
ATLAS CORPORATION (UT)		IS (04/84)
PLATEAU RESOURCES (UT)	CONSUMER POWER COMPANY	IS (08/82)
RIO ALGOM (UT)	RIO ALGOM LTD (CANADA)	OP
EXXON (WY)	EXXON CORPORATION	DR (06/84)
AMERICAN NUCLEAR CORP. (WY)		DR (04/84)
PETROTOMICS (WY)	TEXACO (GETTY OIL)	DR (05/85)
MINERALS EXPLOR. (WY)	UNION OIL COMPANY	IS (11/81)
UMETCO (GAS HILLS) (WY)	UNION CARBIDE CORPORATION	IS (11/81)
WESTERN NUCLEAR (WY)	PHELPS DODGE CORPORATION	DR (00/87)
PATHFINDER (GAS HILLS) (WY)	COGEMA (FRENCH)	SS (04/85)
PATHFINDER (SHIRLEY BASIN) (WY)	COGEMA (FRENCH)	OP
BEAR CREEK (WY)	UNION PACIFIC CORPORATION	DR (00/86)
ANACONDA-BLUEWATER (NM)	ATLANTIC RICHFIELD	DR (00/83)
HOMESTAKE MINING COMPANY (NM)	HOMESTAKE MINING COMPANY	OP
KENNECOTT MINERALS (NM)	SOHIO RESERVE	DR (00/86)
QUIVIRA MINING (NM)	KERR MCGEE CORPORATION	IS (02/85)
UNITED NUCLEAR CORPORATION (NM)	UNITED NUCLEAR CORPORATION	DR (08/79)
BOKUM RESOURCES CORPORATION (NM)		NB
CHEVRON/GULF MINERALS (NM)	STANDARD OIL OF CALIFORNIA	NB
LICENSED BY STATE		
CONOCO-PIONEER NUCLEAR (TX)	DUPONT	DR (00/83)
EXXON MINERALS COMPANY (TX)	EXXON CORPORATION	DR (00/80)
CHEVRON RESOURCES (TX)	STANDARD OIL OF CALIFORNIA	OP
WESTERN NUCLEAR INC. (WA)	PHELPS DODGE CORPORATION	IS (07/84)
DAWN MINING (WA)	NEWMONT MINE CORP. (51%) MIDNITE MINES INC. (49%)	IS (12/83)
JOY MINING COMPANY (WA)		DR/LS (06/85)
COTTER CORPORATION (CO)	COMMONWEALTH EDISON	IS (01/87)
UMETCO MINERALS (CO)	UNION CARBIDE CORPORATION	IS (11/85)
UMETCO MAYBELL (CO) HEAPLEACH	UNION CARBIDE CORPORATION	IS
HECLA (CO) HEAPLEACH		IS

FOOTNOTES:

OP = OPERATING
DR = DECOMMISSIONING AND RECLAMATION UNDERWAY OR PLANNED
IS = INDEFINITE SHUTDOWN
SS = SHORT-TERM SHUTDOWN
NB = NEVER BUILT OR NEVER OPERATED
LS = LICENSE SUSPENDED

ACTIVE URANIUM MILL TAILING PILE VOLUMES
AS OF MARCH 1, 1987

	VOLUMES GENERATED		
FACILITY	FEDERAL CONTRACTS	COMMERCIAL CONTRACTS	TOTAL
	----(MILLIONS	OF SHORT TONS)	----
LICENSED BY NRC			
TVA-EDGEMONT	1.6	2.0	3.6
UMETCO		2.2	2.2
ATLAS	6.0	4.6	10.6
PLATEAU RESOURCES		0.05	0.05
RIO ALGOM		3.3	3.3
EXXON		11.3	11.3
AMERICAN NUCLEAR	2.1	3.8	5.9
PETROTOMICS	0.7	5.7	6.4
MINERALS EXPLOR.		2.4	2.4
UMETCO (GAS HILLS)	2.1	7.1	9.2
WESTERN NUCLEAR	3.4	4.3	7.7
PATHFINDER (GAS HILLS)	2.7	8.0	10.7
PATHFINDER (SHIRLEY BASIN)		7.1	7.1
BEAR CREEK		4.7	4.7
ANACONDA-BLUEWATER	8.8	15.4	24.2
HOMESTAKE MINING	11.4	10.6	22.0
KENNECOTT MINERALS		3.3	3.3
QUIVERA MINING	10.0	23.0	33.0
UNITED NUCLEAR CORPORATION		3.6	3.6
BOKUM RESOURCES CORPORATION			0.0
CHEVRON/GULF MINERALS			0.0
SUBTOTALS	48.8	122.5	171.3
LICENSED BY STATES			
CONOCO-PIONEER NUCLEAR		8.7	8.7
EXXON MINERALS COMPANY		0.5	0.5
CHEVRON RESOURCES		4.5	4.5
WESTERN NUCLEAR INC.		2.3	2.3
DAWN MINING	1.1	1.8	2.9
JOY MINING COMPANY		0.003	0.003
COTTER CORPORATION	0.3	2.4	2.7
UMETCO MINERALS	5.7	5.3	11.0
UMETCO MAYBELL		1.0	1.0
HECLA MINING		0.5	0.5
SUBTOTAL	7.1	27.0	34.1
TOTAL	55.9	149.5	205.4
PERCENT OF TOTAL	27.2%	72.8%	100.0%

ESTIMATED RECLAMATION COSTS FOR ACTIVE URANIUM MILLS

FACILITY	TAILINGS VOLUME (MILLIONS OF SHORT TONS)	CURRENT SURETY AMOUNT (MILLIONS)	COST PER TON (DOLLARS PER TON)
LICENSED BY NRC			
TVA-EDGEMONT	3.6	$ -[f]	$ -
UMETCO (WHITE MESA)	2.2	3.8[a]	1.73
ATLAS	10.6	-[g]	-
PLATEAU RESOURCES	0.05	1.9	38.00
RIO ALGOM	3.3	0.8[a] (3.1)[d]	0.24 (0.94)[d]
EXXON	11.3	8.8[a]	0.78
AMERICAN NUCLEAR	5.9	4.1[a]	0.69
PETROTOMICS	6.4	1.4[a,e]	0.22
MINERALS EXPLOR.	2.4	2.2	0.92
UMETCO (GAS HILLS)	9.2	6.0	0.65
WESTERN NUCLEAR	7.7	11.1	1.44
PATHFINDER (GAS HILLS)	10.7	6.4[a]	0.60
PATHFINDER (SHIRLEY BASIN)	7.1	5.2[a]	0.73
BEAR CREEK	4.7	7.8	1.66
ANACONDA-BLUEWATER	24.2	8.6[a]	0.36
HOMESTAKE MINING	22.0	4.3[a]	0.20
KENNECOTT MINERALS	3.3	11.0[a]	3.33
QUIVERA MINING	33.0	8.2[a]	0.25
UNITED NUCLEAR CORPORATION	3.6	2.5	0.69
BOKUM RESOURCES CORPORATION[b]	0.0	-	-
CHEVRON/GULF MINERALS[b]	0.0	-	-
SUBTOTALS	171.3	94.1	0.55
LICENSED BY STATES			
CONOCO-PIONEER NUCLEAR	8.7	7.2	0.83
EXXON MINERALS COMPANY	0.5	3.0	6.00
CHEVRON RESOURCES	4.5	5.3	1.18
WESTERN NUCLEAR INC.	2.3	6.0	2.61
DAWN MINING	2.9	1.0	0.34
JOY MINING COMPANY	0.003	0.0	-
COTTER CORPORATION	2.7	10.6	3.93
UMETCO MINERALS	11.0	40.0[c]	3.64
UMETCO MAYBELL	1.0	1.3	1.30
HECLA MINING	0.5	0.1	.20
SUBTOTAL	34.1	74.5	2.18
TOTAL	205.4[h]	168.6	0.82

FOOTNOTES ARE ON THE NEXT PAGE

[a] RECLAMATION PLAN WAS UNDERGOING NRC REVIEW AS OF MARCH 1, 1987 AND THE SURETY AMOUNT MAY CHANGE.

[b] NO TAILINGS BECAUSE THE MILL WAS NEVER BUILT OR NEVER OPERATED.

[c] A RECENT COURT AGREEMENT REQUIRES FINAL DETAILED RECLAMATION PLANS AND COST ESTIMATES TO BE SUBMITTED BY MID JUNE 1987. THE 40.0 MILLION DOLLARS WAS AN ESTIMATE PROVIDED BY UMETCO DURING THE COURT NEGOTIATIONS.

[d] VALUE WHEN FULLY FUNDED AT $3,064,312.

[e] SIGNIFICANT RECLAMATION WORK HAS BEEN COMPLETED AT THIS SITE. THE SURETY AMOUNT ONLY COVERS THE REMAINING WORK.

[f] FINAL COSTS ESTIMATED BY TVA ARE $37,000,000 WHICH GIVES $10.28 PER TON FOR THE 3.6 MILLION TONS OF TAILINGS. TVA IS NOT REQUIRED TO HAVE A SURETY THEREFORE THESE VALUES WERE NOT USED IN THE TOTAL SURETY AMOUNTS OR THE COST PER TON CALCULATIONS.

[g] THERE IS NO SURETY IN EFFECT FOR THE ATLAS MILL THEREFORE NO COST VALUES WERE USED IN THE TOTAL SURETY AMOUNT OR THE COST PER TON CALCULATIONS. THE COST ESTIMATE FROM AN OLD RECLAMATION PLAN WAS ABOUT $6,000,000 WHICH GIVES $0.57 PER TON FOR THE 10.6 MILLION TONS OF TAILINGS.

URANIUM MILL LICENSEE
FINANCIAL SURETY ARRANGEMENTS
(LICENSED BY NRC AS OF MARCH 1, 1987)

FACILITY	TYPE OF ARRANGEMENT	AMOUNT	ISSUED TO	SCOPE OF SURETY
TVA-EDGEMONT	NO SURETY REQUIRED	-[a]	-	-
UMETCO	CG/FT	$ 3,792,600	NRC	DECOM.-RECL.
		250,000		LTC[b]
	TOTAL	$ 4,042,600		
ATLAS	NO SURETY	-[e]	-	-
PLATEAU RESOURCES	LC	$ 1,946,393	NRC	DECOM.-RECL.
RIO ALGOM	EA[c]	$ 765,000	UTAH	RECOM.-RECL.
EXXON	LC	$ 8,800,000	WYOMING	DECOM.-RECL.[d]
AM[illegible]AN NU[illegible]LEAR	CD	$ 99,727	WYOMING	DECOM.-RECL.
	LC	$ 500,000	WYOMING	
	TB	$ 3,530,000	WYOMING	
	TOTAL	$ 4,129,727		
PETROTOMICS	LC	$ 1,432,205	WYOMING	DECOM.-RECL.
		416,250		LTC[b]
	TOTAL	$ 1,848,455		
MINERALS EXPLOR.	CG	$ 2,231,892	WYOMING	DECOM.-RECL.[d]
		365,000		LTC[b]
	TOTAL	$ 2,596,892		
UMETCO (GAS HILLS)	SB	$ 6,044,600	WYOMING	DECOM.-RECL.
WESTERN NUCLEAR	SB	$11,114,767	WYOMING	DECOM.-RECL.
		250,000		LTC[b]
	TOTAL	$11,364,767		
PATHFINDER (GAS HILLS)	LC	$ 6,403,500	NRC	DECOM.-RECL.
		350,000		LTC[b]
	TOTAL	$ 6,753,500		
PATHFINDER (SHIRLEY BASIN)	LC	$ 5,168,300	NRC	DECOM.-RECL.
		350,000		LTC[b]
		$ 5,518,300		

FACILITY	TYPE OF ARRANGEMENT	AMOUNT	ISSUED TO	SCOPE OF SURETY
BEAR CREEK	CG	$ 7,847,000	WYOMING	DECOM.-RECL.[d]
		432,000		LTC[b]
	TOTAL	$ 8,279,000		
ANACONDA-BLUEWATER	SB	$ 8,625,000	NEW MEXICO[f]	DECOM.-RECL.
	EA	$ 1,000,000		LTC[b]
	TOTAL	$ 9,625,000		
HOMESTAKE MINING	OG	$ 4,252,750	NEW MEXICO[f]	DECOM.-RECL.
	EA	$ 1,000,000		LTC[b]
	TOTAL	$ 5,252,750		
KENNECOTT MINERALS	SB	$10,950,000	NEW MEXICO[f]	DECOM.-RECL.
	EA	246,390		LTC[b]
	TOTAL	$11,196,390		
QUIVIRA MINING	CG	$ 8,200,000	NEW MEXICO[f]	DECOM.-RECL.
	EA	$ 1,000,000		LTC[b]
	TOTAL	$ 9,200,000		
UNITED NUCLEAR CORP.	OG	$ 2,500,000	NEW MEXICO[f]	DECOM.-RECL.
	EA	703,797		LTC[b]
	TOTAL	$ 3,203,797		
BOKUM RESOURCES CORP.	NB	-		
CHEVRON/GULF MINERALS	NB	-		

FOOTNOTES

CD = CERTIFICATE OF CREDIT
LC = LETTER OF CREDIT
TB = TREASURY BILL
OG = OWNER GUARANTEE
NB = MILL NEVER BUILT OR NEVER OPERATED

CG = CORPORATE GUARANTEE
EA = ESCROW ACCOUNT
SB = SURETY BOND
FT = FINANCIAL TEST
DECOM. = DECOMMISSIONING
RECL. = RECLAMATION
LTC = LONG-TERM CARE

[a] SEE FOOTNOTE f ON PAGE 16.

[b] LTC FUNDS ARE NOT TO BE USED FOR RECLAMATION, THEREFORE THEY SHOULD NOT BE USED IN THE COST ESTIMATES ON PAGES 6 AND 15.

[c] NOT FULLY FUNDED, REQUIRES $3,064,312.

[d] INCLUDES SOME MONEY FOR GROUNDWATER RESTORATION.

[e] COST ESTIMATE BY ATLAS WAS $5,989,625 BASED ON AN OLD RECLAMATION PLAN.

[f] THE SURETIES HELD BY NEW MEXICO DO NOT MEET THE STANDARDS IN CRITERIA 9 AND 10 OF APPENDIX A TO 10 CFR PART 40.

URANIUM MILL LICENSEE
FINANCIAL SURETY ARRANGEMENTS
(LICENSED BY STATES AS OF MARCH 1, 1987)

FACILITY	TYPE OF ARRANGEMENT	AMOUNT	ISSUED TO	SCOPE OF SURETY
CONOCO-PIONEER NUCLEAR	OG	$ 7,187,634	TEXAS	RECL. & LTC
EXXON MINERALS CO.	CG	$ 3,000,000	TEXAS	RECL. & LTC
CHEVRON RESOURCES	CG	$ 5,292,397	TEXAS	RECL. & LTC
WESTERN NUCLEAR INC.	SB	$ 6,000,000	U.S. DEPT. OF INTERIOR	RECLAMATION
DAWN MINING	LC	$ 1,000,000	WASH.	DECOM.-RECL.
JOY MINING CO.	NO SURETY[b]			
COTTER CORP.	SB	$ 10,500,000	COLORADO	DECOM.-RECL.
	CO	$ 68,000	COLORADO	DECOM.-RECL.
	EA	$ 329,383	COLORADO	LTC[a]
	TOTAL	$ 10,897,383		
UMETCO MINERALS	CG/FT	$ 40,000,000	COLORADO	DECOM.-RECL.
UMETCO (MAYBELL)	LC	$ 1,300,000	COLORADO	DECOM.-RECL.
	LC	$ 490,000	COLORADO	LTC[a]
	TOTAL	$ 1,790,000		
HECLA MINING CO.	UB	$ 105,000	COLORADO	DECOM.-RECL.

FOOTNOTES

CO = COLLATERAL
LC = LETTER OF CREDIT
FT = FINANCIAL TEST
CG = CORPORATE GUARANTEE
DECOM. = DECOMMISSIONING
LTC = LONG-TERM CARE

EA = ESCROW ACCOUNT
SB = SURETY BOND
OG = OWNER GUARANTEE
UB = UTILITY BOND
RECL. = RECLAMATION

[a] LTC FUNDS ARE NOT TO BE USED FOR RECLAMATION, THEREFORE THEY SHOULD NOT BE USED IN THE COST ESTIMATES ON PAGES 15 AND 5.

[b] THE STATE OF WASHINGTON HAD A SURETY BOND FOR $93,000.00 FOR DECOMMISSIONING AND RECLAMATION. WHEN THE STATE SUSPENDED THE LICENSE FOR THE JOY MINING FACILITY, THEY REQUESTED PAYMENT OF THE BOND. AT THAT TIME, HOWEVER, THE BONDING COMPANY WAS IN BANKRUPTCY AND NO FUNDS HAVE BEEN COLLECTED.

SELECTED COMPANY 1984 FINANCIAL RESOURCES

PARENT COMPANY	TOTAL ASSESTS	LIABILITIES	TOTAL STOCKHOLDERS EQUITY	REVENUES	NET INCOME LOSS
	---BILLIONS OF DOLLARS---				
EXXON CORP.[a]	$63.3	$34.4	$28.9	$97.3	$5.5
TEXACO (GETTY OIL)	$37.7	$24.0	$13.7	$47.9	$0.3
DUPONT	$24.1	$11.9	$12.2	$36.2	$1.4
ATLANTIC RICHFIELD	$22.1	$12.2	$ 9.9	$25.2	$0.6
UNION CARBIDE CORP.[a]	$10.5	$ 5.6	$ 4.9	$ 9.5	$ 0.3
UNION PACIFIC CORP.[a]	$10.4	$ 5.7	$ 4.7	$ 7.9	$ 0.5
KERR McGEE CORP.	$ 3.8	$ 2.0	$ 1.8	$ 3.5	$ 0.1
PHELPS DODGE CORP.	$ 1.7	$ 0.9	$ 0.8	$ 0.9	$(0.3)
MILL OWNERS	---MILLIONS OF DOLLARS---				
HOMESTAKE MINING	$692.5	$135.0	$557.5	$319.7	$ 29.2
ATLAS CORP.	$103.3	$ 19.4	$ 83.9	$ 41.5	$ (3.9)
AMERICAN NUCLEAR	$ 25.5	$ 27.5	$ (2.0)	$ 0.3	$(10.5)
MIDNITE MINES[b]	$ 3.5	$ 0.2	$ 3.3	$ 0.0	$ (0.0)

[a] PARENT COMPANY THAT HAS EXECUTED CORPORATE GUARANTEE WITH NRC OR STATE.

[b] MIDNITE MINES INC. OWN 49% OF DAWN MINING CO. NEWMONT MINES HOLDS THE REMAINING 51%.

SOURCE: SECURITIES AND EXCHANGE COMMISSION. (SEC FORMS 10K AND 10Q FOR CALENDAR YEAR 1984)

THE NRC SOURCES OF INFORMATION FOR UPDATING THE GAO REPORT

The data used to update the GAO report was collected as follows:

1. Tailings Volumes
   - Volumes for the Agreement State licensees were provided by the State Health Departments of Colorado, Texas, and Washington.
   - Volumes for the NRC licensees were provided by the NRC Uranium Recovery Field Office as obtained from the individual mill operators.
   - Volumes for the AEC contract tailings were from the DOE Comingled Tailings Report (June, 1982).
2. Surety Amounts and Mechanisms
   - Surety amounts and mechanisms for Agreement State licensees were provided by the State Health Departments.
   - Surety amounts and mechanisms for NRC licensees were provided by the NRC Uranium Recovery Field Office in Denver, CO.

The general NRC surety requirements and the process NRC uses to approve surety mechanisms and develop surety amounts are presented in the following discussion. The NRC regulations on financial surety arrangements for uranium recovery operations are contained in Criteria 9 and 10 of Appendix A to 10 CFR Part 40.

Criterion 9 requires mill operators to establish financial surety arrangements to carry out the decontamination and decommissioning of the mill and site and for reclamation of any tailings or waste disposal areas. The amount of funds to be ensured by such surety arrangements are to be based on Commission-approved cost estimates in a Commission-approved decommissioning and reclamation plan. The surety must also cover the long-term care charge specified in Criterion 10.

Criterion 9 states that the following surety arrangements are acceptable:

1. Surety bonds
2. Cash deposits
3. Certificates of deposits
4. Deposits of government securities
5. Irrevocable letters or lines of credit, and

ENCLOSURE 2

6. Combinations of the above or such other arrangements as may be approved by the Commission.

In addition to the above arrangements, the Division of Waste Management of the Office of Nuclear Material Safety and Safeguards has issued a policy statement which allows the use of a parent corporation guarantee in conjunction with a financial strength test of the parent corporation.

The use of any arrangement which essentially constitutes self-insurance is specifically prohibited, since this provides no additional assurance other than that which exists through license requirements.

The licensee must submit a reclamation plan as part of its license application (new, renewal, or major amendment) which includes the licensee's estimate of the cost of decommissioning and reclamation for NRC approval of the plan. The NRC staff performs its own independent assessment of the costs using available contractor costs for the geographic area.

Criterion 10 requires that each mill operator must pay, prior to the termination of the mill license, a minimum charge ($250,000 in 1978 dollars) to cover the costs of long-term surveillance. The amount of this charge is adjusted for inflation by using the Consumer Price Index. The current adjusted charge would be $407,960 (1986 dollars). This amount must be included in the surety required in Criterion 9.

Typical steps a licensee follows to obtain NRC approval of a surety arrangement are:

1. Submit a decommissioning and reclamation plan for NRC review.

2. Upon NRC approval of the engineering aspects of the proposed plan, the licensee updates the cost breakdown to accomplish the approved plan. The licensee usually submits a draft cost breakdown as part of the reclamation plan.

3. Within 90 days of NRC approval of the plan including cost estimates, the licensee must supply NRC evidence that an effective surety is in place. This is usually shown by the licensee submitting a copy of the effective surety arrangement.

4. The licensee is required, at least annually, to assure that the surety provides sufficient funds to complete the reclamation plan if the work had to be performed by an independent contractor. The amount of the surety must be adjusted to recognize any increases or decreases resulting from inflation, changes in engineering plans, activities performed, and any other conditions affecting costs.

The NRC staff is currently reviewing eleven reclamation plans which, when approved, may affect the existing sureties for those facilities.

AVLIS Uranium Enrichment Program

Statement prepared for
Subcommittee on
Energy Research and Development
Senate Committee on Energy and Natural Resources

March 1987

University of California
Lawrence Livermore
National Laboratory

AVLIS Uranium Enrichment Program

Statement prepared for
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Senate Committee on Energy and Natural Resources

by
John L. Emmett
Associate Director for Lasers
Lawrence Livermore National Laboratory

March 1987

AVLIS Uranium Enrichment Program

I would like to express my appreciation to this Committee for the opportunity to present a statement on the AVLIS Program and our views of the United States Uranium Enrichment Enterprise.

The objective of the AVLIS Program is to develop and deploy a technology for producing low-cost separative work, thus assuring the United States a competitive position in the international uranium enrichment market. Since our work on AVLIS for uranium enrichment is solely for that objective, it is appropriate to outline some of the issues in our country's Uranium Enrichment Enterprise. We believe that the successful deployment of AVLIS is necessary for the revitalization of the United States Uranium Enrichment Enterprise and that through the deployment of AVLIS it may be possible for the United States to regain its once dominant role in this endeavor.

Uranium Enrichment Enterprise Issues

The international marketplace for enriched uranium has been, and continues to be, increasingly competitive. The United States Enrichment Enterprise is under continuing pressure. Foreign suppliers continue to target the DOE market share and the energy cost associated with operating the Gaseous Diffusion Plants (GDPs) will make them noncompetitive within the next decade (Figure 1). The Department of Energy, and two European consortia, Eurodif and Urenco, now supply approximately 90% of the Free World's nuclear fuel. However, Figure 2 shows that our foreign competition has captured almost one-half of what was formerly the United States' monopoly position. In addition, by 1991 a Japanese group will begin supplying significant quantities of separative work for the Japanese nuclear utilities. The Soviet export company, Techsnabexport (Techsnab), typically supplies approximately 3 million Separative Work Units (MSWU) per year to the West in exchange for hard currency.

All of these suppliers are now vying for position in the present $3 billion/year enrichment business. Figure 3 indicates that a market of this size is expected to exist for the next 20 years; in fact, the projections for SWU requirements during the next 15 years show a modest (3%/year) steady increase. These estimates, based on existing or approved power plants, indicate that the international market will require 35-40 MSWU yearly by the year 2000. One other important trend must be noted. In approximately 10 years there will be a large (10-15 MSWU/year) price-sensitive market. This market, composed of both foreign and domestic demand, will define the competitive "battlefield" in the years ahead. By the end of the next decade, the swing in the U.S. balance of payments between aggressively selling enrichment abroad versus abandoning the business and buying abroad is approximately $4B.

How competitive will the United States Enrichment Enterprise be in this market situation? First, we must look at our competitors' capabilities (Figure 4). Based on proven technologies operating in modern facilities, both Eurodif and Urenco are expected to be able to reduce their prices for nuclear enrichment in the years to come. Our analysis, using today's exchange rates, projects their costs to be approximately $70-75/SWU. Eurodif can increase its 11-MSWU/year production capacity by approximately 10 to 15%. The Urenco partners, West Germany, the United Kingdom, and the Netherlands, now supplying 2 MSWU/year, are vigorously marketing and have the manufacturing capability to rapidly increase their production capacity. These are formidable competitors when we consider them against the United States' Gaseous Diffusion Plants at Portsmouth, Ohio and Paducah, Kentucky. These energy-intensive facilities are projected to be less competitive in the 1990s. Acid-rain legislation, if passed, will increase the cost of electricity and raise the United States' SWU production costs even further. The United States Enrichment Enterprise could then be forced out of the business, or alternatively require substantial government subsidies.

We all know that this is not an acceptable situation. The long-term loss of this national asset is more than a loss of revenue - it threatens this country's role as a significant participant in a major worldwide energy activity (Figure 5). It would force the importing of nuclear fuel, negatively impacting our balance-of-trade and continuing the erosion of our already precarious strategic energy security. The country would lose its influence on international safeguards and become less effective in its nuclear nonproliferation efforts. Finally, the United States would lose an opportunity to be the first to deploy a major new technology - AVLIS.

These considerations suggest that decisive action is required. The United States is now uniquely positioned to reverse its loss of market share and to revitalize the enrichment industry. Two goals must be accomplished (Figure 6). First, in the very near term, the Department of Energy must regain the confidence of its customers by demonstrating that it intends to remain a cost-competitive and reliable supplier. Second, the Enrichment Enterprise must act expediently in the deployment of low-cost enrichment technology to displace our aging and energy-intensive Gaseous Diffusion Plants.

The Congress can structure the Enterprise to meet these criteria. Many think "privatization" or the formation of a government corporation will result in the Enterprise being conducted in a businesslike manner that will lower production costs and instill customer confidence. We surely agree that action of this sort is required; but alone it is not sufficient. The long-term profitability of this, or any other business, requires a good product (low-cost SWUs) marketed and deployed in a timely manner (1995-2000).

The AVLIS process can meet this global need for low-cost enrichment in the post-1995 period. It is the only technology available in the world today that can significantly undercut our competition. In addition, the United States now has a 4-7 year lead on foreign AVLIS efforts. Both the Japanese and French governments have completed independent analyses of their enrichment businesses and each has announced its intention to rapidly develop AVLIS technology. The French intend to deploy AVLIS before the turn of the century.

The AVLIS Program Status

The past year has been extremely productive in moving AVLIS technology forward. A schematic of the basic AVLIS system is shown in Figure 7. The Program's efforts have resulted in the completion of many activities that continue to prove the fundamental economic viability of AVLIS. This work was mostly accomplished in our Full-Scale Demonstration Facility pictured in Figure 8.

Last year at this time around-the-clock laser system operation was just beginning. I am happy to say that since then the Laser Demonstration Facility, pictured in Figure 9, has been running continuously. We have now accumulated over 200,000 unit hours of copper-laser operation. During this time, parallel engineering and development efforts have led to a factor of 10 increase in key laser component lifetimes and reliability and a concurrent factor of 3 improvement in reliable laser power. For example, the laser power supplies, one of the critical electronic components, now have demonstrated reliability of nearly 20,000 hours, approximately 70% of the plant goal. This reliability is rising steadily as testing continues and is charted in Figure 10. The output power of the copper-laser corridor is nearly 3000 watts, which is delivered to the dye lasers reliably and with high availability. The dye-laser system has been integrated and operated at key plant specifications; achieving full repetition rate will require the installation of additional copper lasers. More than 500 watts of light have been produced in the Laser Demonstration Facility and efficiently transmitted to the Mars Separator Facility to achieve full point design laser energy per pulse. This is the highest-power visible laser system ever operated continuously. Additionally there have been good results in our value-engineering effort with a 40% reduction in the cost of copper-laser tubes. This is a key driver in plant laser economics. A summary of this progress is found in Figure 11. The development of the around-the-clock operating crews and appropriate procedures to safely and effectively run this system reflect our intent to produce AVLIS hardware transferable to the private sector. This resulted in the reliable operation of the dye-laser system that is shown in Figure 12.

The major efforts in the separator area include fully integrated operation of the Mars half-scale separator and long-term operation of the full-scale Separator Demonstration Facility shown in Figure 13. Progress has been made in operation of the full-scale vaporizer in the Separator Demonstration Facility. Basic material compatibility and improvements in reliability and operating procedures have been demonstrated in a series of runs this past year. The last run of 1986 continued for more than 100 hours and has provided important insight on design features necessary for very long vaporizer life. Over 5 metric tonnes of material were vaporized during this run alone. In addition, improved materials offering longer life and the potential for better plant economics have been identified and tested at Oak Ridge. Emphasis in the coming months will be on refining full-scale separator designs and incorporating improved materials as appropriate.

In a series of Mars separator runs culminating in the recent enrichment series, we have demonstrated our ability to smoothly start a separator from room temperature, to establish and maintain segregated flow of liquid uranium from its components, and to trim and set internal temperatures. These achievements have largely resolved three outstanding issues raised by the Process Evaluation Board 2 years ago. The separator achievements described here are summarized in Figure 14.

These engineering and operational improvements were responsible for the 36-hour steady-state enrichment demonstration completed on February 6 and 7 of this year. The results are described in Figure 15 and in the text below. Over 600 kg of feed were evaporated and the enriched product assay was nearly 1%. During this run, conditions for both the separator and the pulsed laser illumination were maintained steadily and without degradation at values close to those projected for plant operation. These results provide further evidence of the fundamental capability of AVLIS to meet its plant performance projections.

AVLIS Program Plan

The AVLIS Uranium Program is clearly in a position to make major strides toward the full-scale technology and engineering demonstrations required to authorize plant deployment and to make the Enterprise attractive for privatization. Figure 16 describes the AVLIS Program's readiness for forward progress. The combined Lawrence Livermore National Laboratory/Martin Marietta Energy Systems, Inc. (LLNL/MMES) staffs have been chosen because they have the skills required for this effort. They include scientists, development and project engineers, operating technicians, and resource managers. The facilities at the LLNL site have been developed to accept plant prototypical hardware and allow operation in an industrial environment. Several independent review panels in recent years have recognized that the dedication and skill of our staff are second to none. Realization of the benefits offered by this combination of personnel and facilities and a healthy return on the country's investment in AVLIS is now in our grasp. Stability of purpose and sufficient funding are required for forward motion.

We are now in the process of evaluating the long-term Program plan. There are three basic planning options (Figure 17). The President's Budget, with zero funding for AVLIS, closes out the Program next year. Option 2, the Technology Development and Demonstration Program (TD&D), is geared to finish a full-scale hardware demonstration with the goal of demonstrating that the integrated process works as projected and that plant capital and operating costs are achievable. Option 3 is the Technology Development & Demonstration Program restructured for initial AVLIS plant production in 1996. It includes a full-scale engineering demonstration of the plant hardware. This engineering demonstration will establish readiness for final plant engineering and confirm plant cost projections.

Before discussing our proposed plans, let me comment on the impact of the Administration's proposed close-out of the AVLIS Program at the Laboratory and the long-term viability of the enrichment business.

The President's budget request includes zero funding for the AVLIS Uranium Program in FY88. This plan would obviously have a devastating effect on this country's leadership in the area of advanced uranium enrichment technology and a profound impact on both the near- and long-term future of uranium enrichment in the United States (Figure 18).

Termination of AVLIS could have a large impact on the manpower level at Lawrence Livermore National Laboratory as a whole. Today the AVLIS Uranium Program's total manpower is approximately 430. With a zero budget for AVLIS Uranium in FY88, all 120 of our supporting contractor personnel would be released. Forty Martin Marietta personnel would disperse to other sites, or receive layoff notices. Of the 310 LLNL employees, approximately 100-150 could be absorbed in the Laboratory and the remainder would have to be given layoff notices.

Obviously, termination of AVLIS development in FY88 would disband the team and shut down the AVLIS facilities. (As an aside, without the infusion of additional funds from Defense Programs, it may have an equally devastating effect on the SIS Program.) Some might consider it conceivable to restart the Program in future years if the United States were to decide to become competitive once again in uranium enrichment, but the original team, many with a decade of AVLIS experience, could never be reassembled -- the best of them would have gone on to other important challenges. The resulting delay and additional costs are difficult to estimate, but would surely be in the range of many years and several hundreds of millions of dollars. Since we only have a 4-7 year lead on our competitors, a restart of AVLIS after termination would not necessarily place the United States back in a leadership position in uranium enrichment. In any event, termination would mean that the United States would, for many years, be forced to subsidize or otherwise protect the no-longer competitive GDPs and lose our position in the world enrichment market in 1995-2000 and beyond. In the short term, it is likely that the abandonment of AVLIS probably would reduce the confidence of the utilities in DOE's intent to stay in the enrichment business.

Let me also address the likelihood of privatization of AVLIS in the absence of continued federal funding. The economics of a future AVLIS plant are equally attractive to either the United States Government or a private investor. However, significant private investment is unlikely until technology demonstration nears its completion and AVLIS is ready to move into the deployment phase. Termination of federal support for AVLIS development prior to these demonstrations makes privatization extremely unlikely. In addition, a private enrichment corporation would face government, or quasi-government competitors abroad. Thus it appears that some sort of United States government support or guarantees would be required to privatize the United States Enrichment Enterprise.

It is clear that continued development of AVLIS is needed to preserve the option for a competitive United States uranium enrichment capability, whether government or private. What is the best program planning option for the Uranium Enrichment Enterprise? Deployment of AVLIS in the mid-1990s would be optimum for keeping DOE's customers, capturing the price-sensitive market, and maintaining a vital Enrichment Enterprise. Planning Option 3, the Technology Development and Demonstration Program structured for AVLIS plant deployment in 1996, would ideally fit this scenario. It is our recommendation. Figure 19 gives a detailed view of the budget and associated activities. The main checkpoints are a full-scale technology demonstration in 1991 followed by an engineering demonstration in 1992. The AVLIS plant would be activated from 1996 through the year 2002.

In view of the uncertainties that exist in the Enterprise, the AVLIS Program must be flexible to be responsive to market conditions that might alter the timing of the plant's economic objectives. The intrinsic modularity of the AVLIS hardware allows this kind of flexibility. Very importantly, the Program must also be sensitive to present uncertainties in its own budget allocations. We have structured our Program Plan so that in FY88 either Option 2 or Option 3 requires identical funding.

AVLIS funding should be at a level sufficient to permit efficient use of existing facilities and to retain a vigorous, experienced staff until AVLIS is demonstrated and ready for deployment. A budget of $100M in FY88 is needed for effective, continued progress. In particular, as shown in Figure 20, our efforts at the $100M level will be directed toward:

o Continued upgrade of the Laser Demonstration Facility. The next step will include a factor of 2 increase in both output power and repetition rate, significantly enhancing enrichment testing capabilities.

o Continued improvements in life and reliability of laser-system components, approaching within a factor of 2 many major plant goals.

o Design optimization and continued demonstration of uranium separator system designs at levels that are significant for test of full-scale plant design features.

o An increased level of material development and engineering activities at the MMES facilities in Oak Ridge. Work will be extended to cover advanced materials that offer lower separator capital and operating costs.

o Update of the point design for the production facility, incorporating the latest concepts and demonstrations for lasers, separators, and system integration.

A budget level of $100M will allow these activities to proceed in a logical manner toward the goal of full-scale integrated enrichment demonstration by FY89/90. Lower budget allocations will result in inadequate support of key technology areas. This will surely result in schedule delays that could strategically damage the AVLIS Program and the Enterprise.

Funding at approximately $100M level in FY88 and stable funding in the next few years will allow the United States to remain competitive in uranium enrichment for decades to come. AVLIS closeout in FY88 virtually guarantees that the United States will become dependent on foreign enrichment, probably using the AVLIS process, by the end of the century.

The joint Lawrence Livermore National Laboratory/Martin Marietta Energy Systems team stands ready to respond to the technical challenges upon us. With your support, and the development of a comprehensive plan for the overall enterprise, construction of an AVLIS production plant on an economically attractive time scale will be assured (Figure 21).

I would like to thank this Committee for your interest and the opportunity to submit this testimony for the record.

Uranium enrichment is a highly competitive business

- Highly competitive market results from surplus supply and low market growth
- Foreign suppliers continue to target DOE market share
  - Capacity expansion
  - Unfavorable exchange rates if the dollar strengthens
- Gaseous diffusion plants will become noncompetitive because of increased power costs
  - Inflation
  - Acid-rain legislation
  - Potential oil crisis

Figure 1

3/5/87EIM-2D34

DOE world enrichment market share

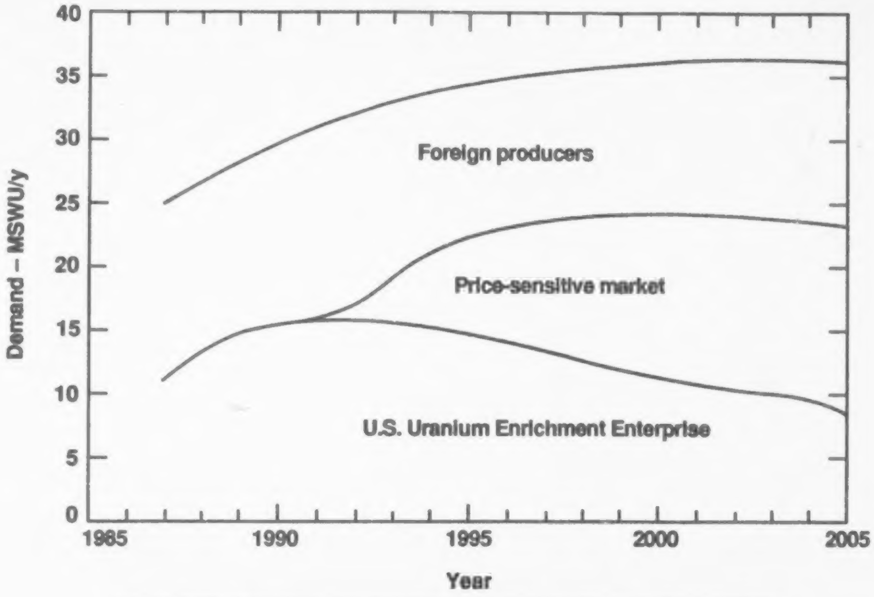
	1974	1987
● DOE Uranium Enrichment Enterprise	100%	50%
● Eurodif (French lead consortium)	0%	32%
● Urenco (United Kingdom, Netherlands, FRG)	0%	7%
● Techsnab (USSR)	0%	6%
● Secondary market	0%	5%

Figure 2

3/5/87EIM-4D34

Consideration of the future world market for separative work

MARTIN MARIETTA



The U.S. balance of payments swings $4B if we abandon aggressive export for import by the year 2000

Figure 3

3/2/87MLS-10AD34

Foreign enrichment competition

- Eurodif capacity is now 11 MSWU/year
  - — Can be increased to ~12.5 MSWU/year; LLNL projects cost to be ~$75/SWU*
  - — Plan AVLIS deployment in late 1990s
- Urenco capacity is now ~2 MSWU/year
  - — Aggressively marketing in Europe, Japan, and the United States
  - — Has manufacturing infrastructure to expand production capacity rapidly
  - — LLNL projects future costs to be ~$70/SWU*
- Japan is constructing first 1.5 MSWU/year plant (early 1990s operation)
  - — Second 1.5-MSWU/year increment scheduled for late 1990s operation
  - — Has established $130M AVLIS Program in near term
- USSR typically has available ~3 MSWU/year at 5 to10% below market prices
  - — Recent rumors of offers at $65 to 70/SWU*

— The competitive position of our diffusion plants will be at risk in the 1990s
— AVLIS likely to be deployed by competition by 2000

*For March 87 exchange rates

Figure 4

Motivation for continuing a strong U.S. enrichment capability

- The U.S. desires to remain a significant force in the international enrichment market place
  - Energy security
  - Balance-of-trade
  - Relationship between commercial enrichment and the supply of special nuclear materials
  - Safeguards and nonproliferation
  - Technological competitiveness
  - U.S. employment

Figure 5

How can the U.S. Enrichment Enterprise remain viable?

- Restore Enterprise stability
  - In the near term by building confidence on the part of utilities that the U.S. intends to remain competitive
  - In the long term by developing the ability to construct and operate a significantly lower-cost enrichment technology

- Successful deployment of AVLIS will replace our GDP capacity, help capture the price-sensitive market expected in the 1990s, and ensure long-term Enrichment Enterprise viability
  - AVLIS enrichment costs continue to be projected in the $25–40/SWU range

Figure 6

Atomic vapor laser isotope separation (AVLIS)

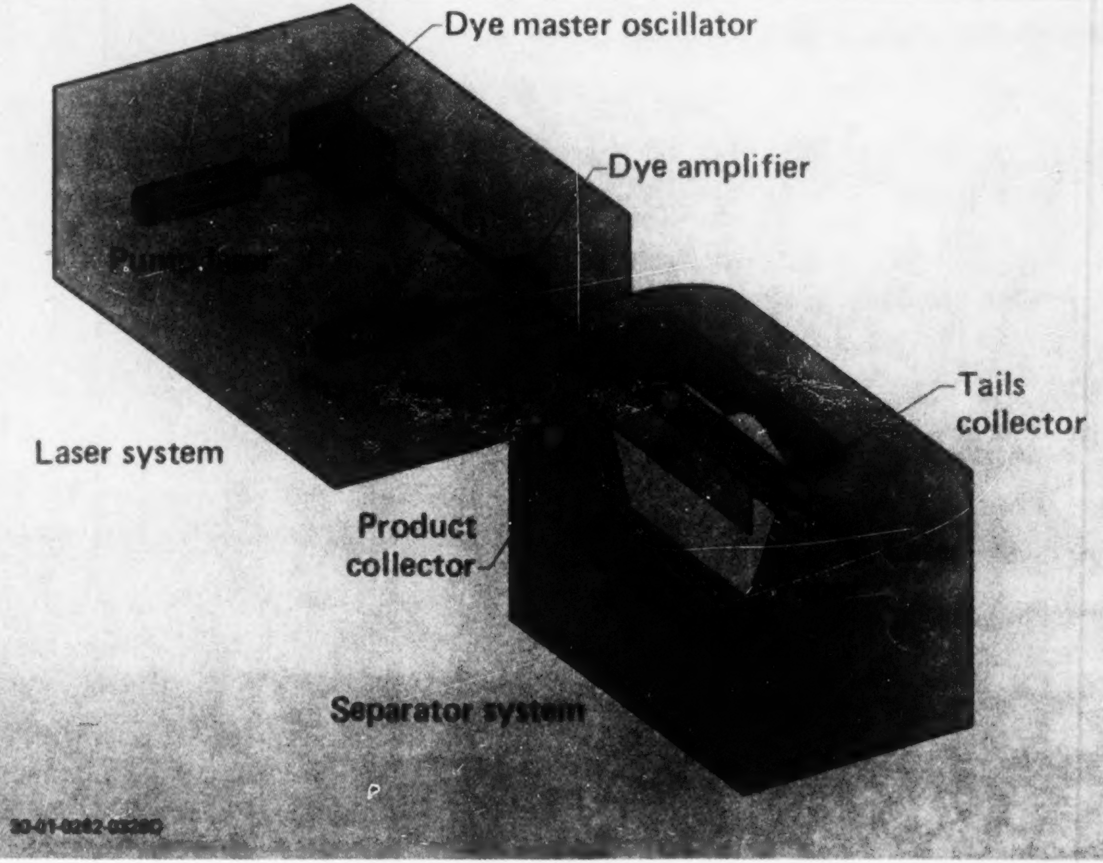

Dye master oscillator
Dye amplifier
Pum
Laser system
Tails collector
Product collector
Separator system
30-01-0282-0328D

Figure 7

AVLIS Full-Scale Demonstration Facility

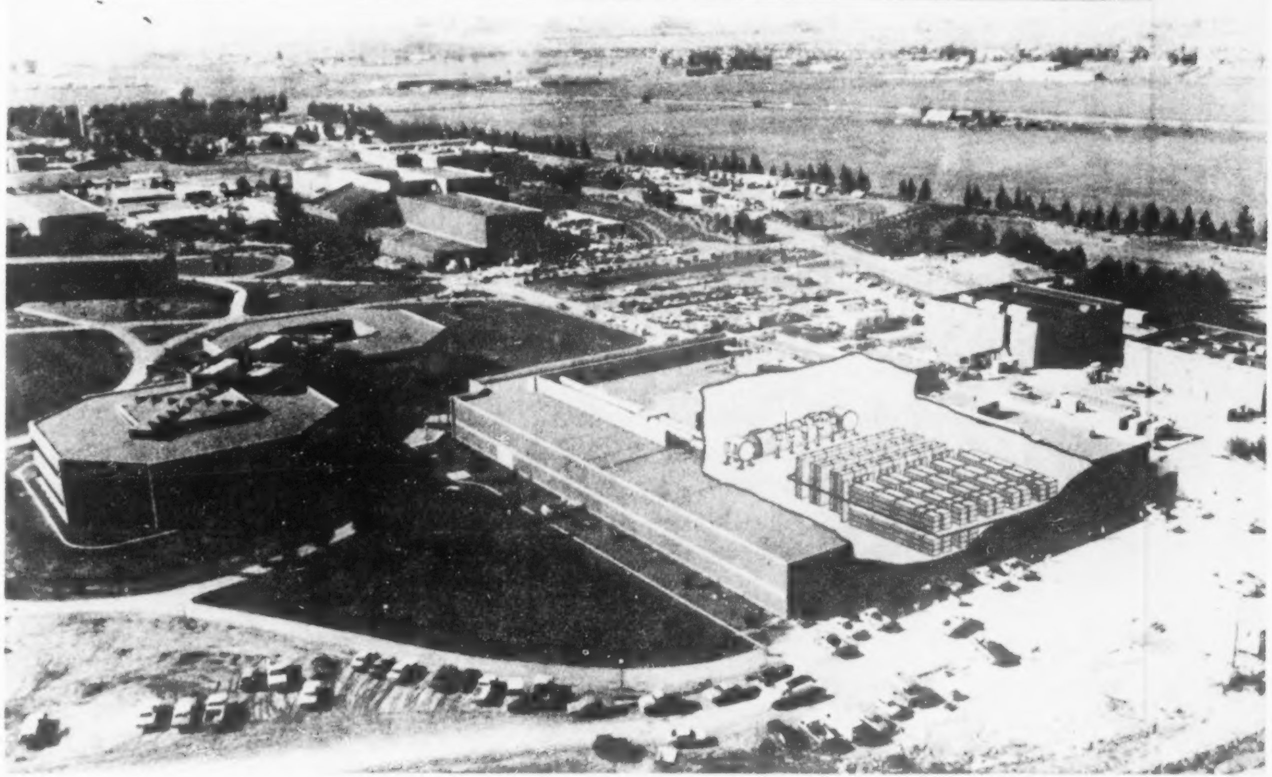


Figure 8

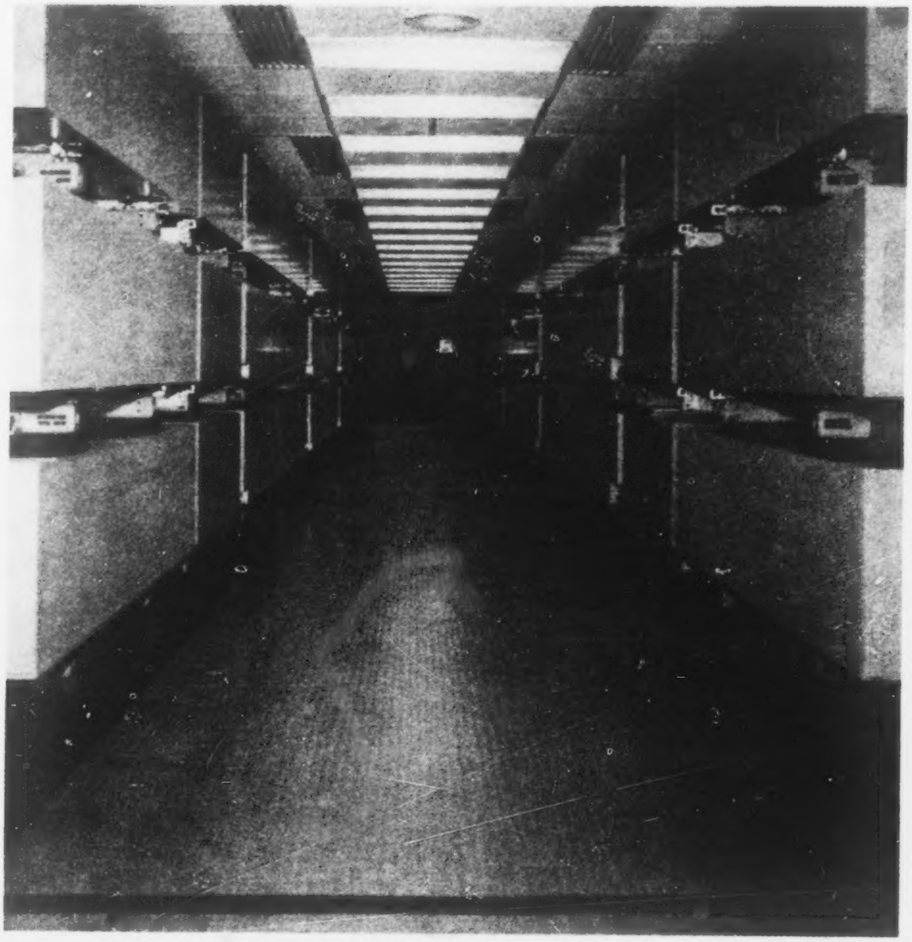


Figure 9

Copper-laser power supply reliability growth

- Crucial electronic component now has one failure for every 2 years of operation

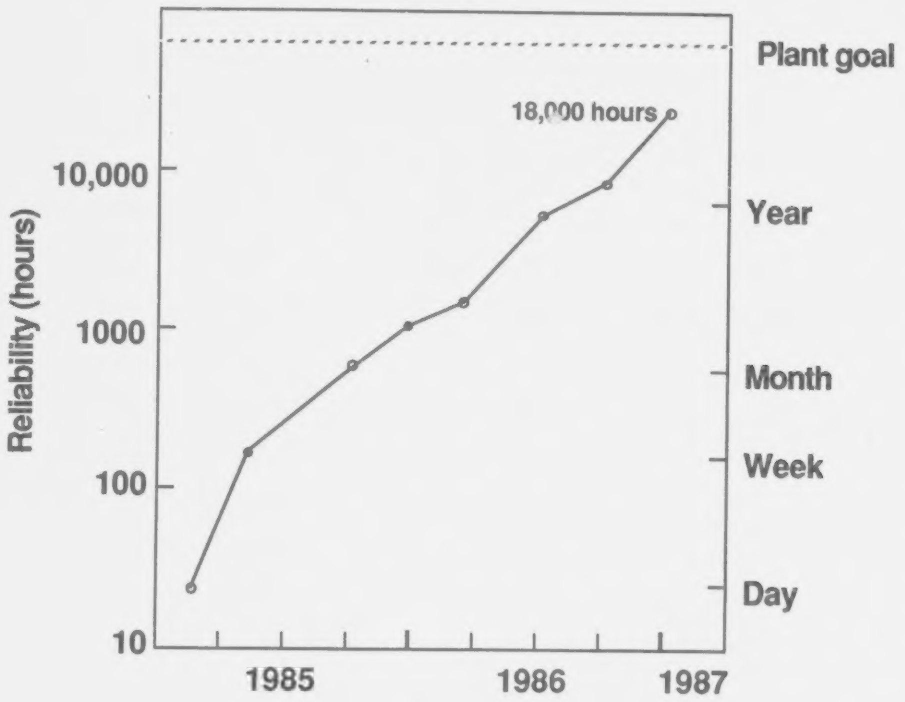


Figure 10

3/5/87EIM-9D34

Major AVLIS Program accomplishments—Laser system

- Laser system has run continuously (24 hours/day) for 17 months
  - 200,000 hours accumulated on copper lasers
  - 4-fold increase in copper-laser power to 3000 watts
  - 10-fold increase in dye-laser power to 500 watts
  - 5-fold increase in copper-laser reliability to 400 hours

- Laser system has delivered plant point design pulsed energy light to half-scale separator
  - Excellent photoionization demonstrated

- Laser product engineering has led to reduced manufacturing costs
  - Higher-quality plasma tubes procured at 60% of last year's cost

Figure 11

3/5/87EIM-17D34

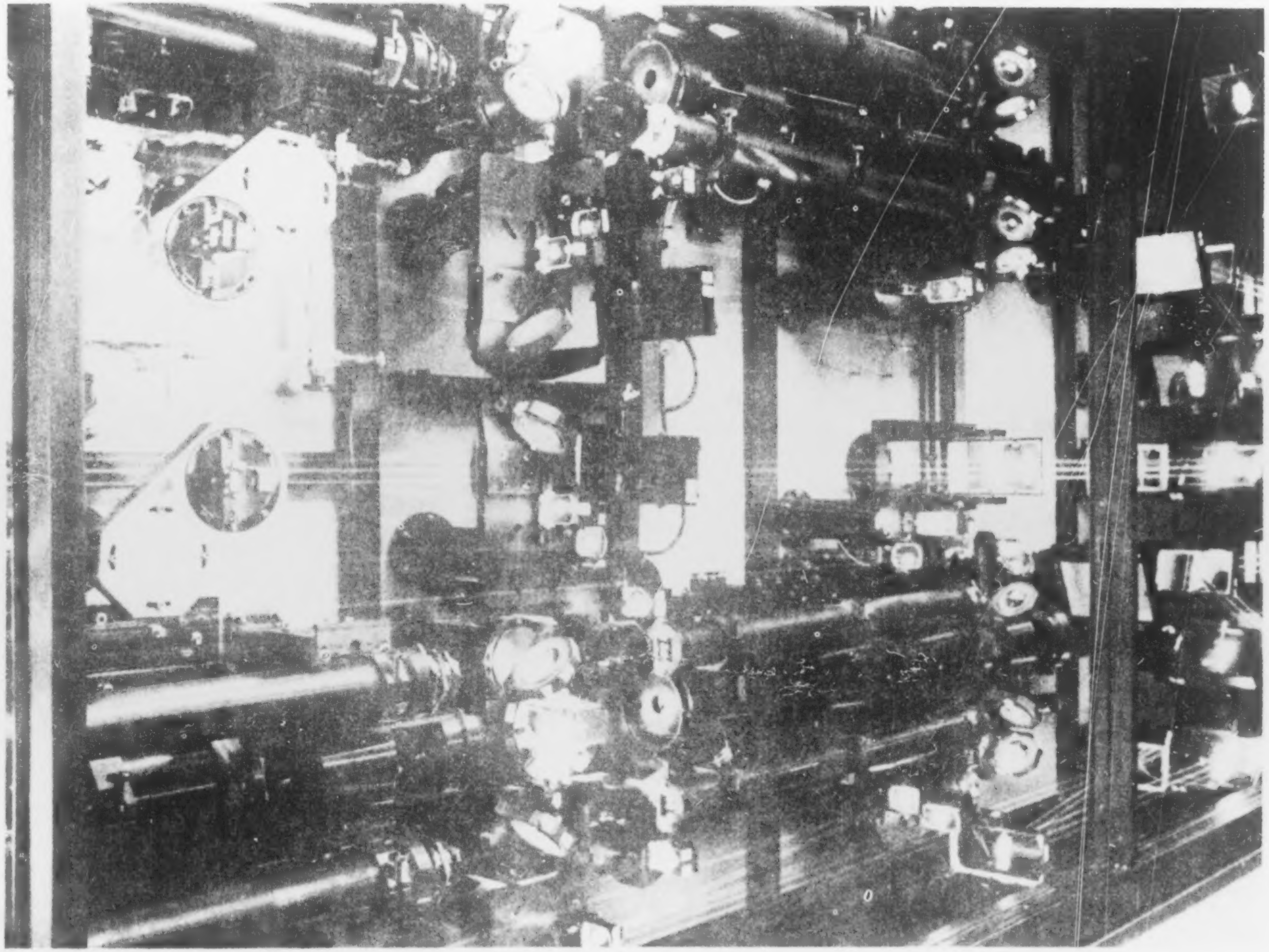


Figure 12

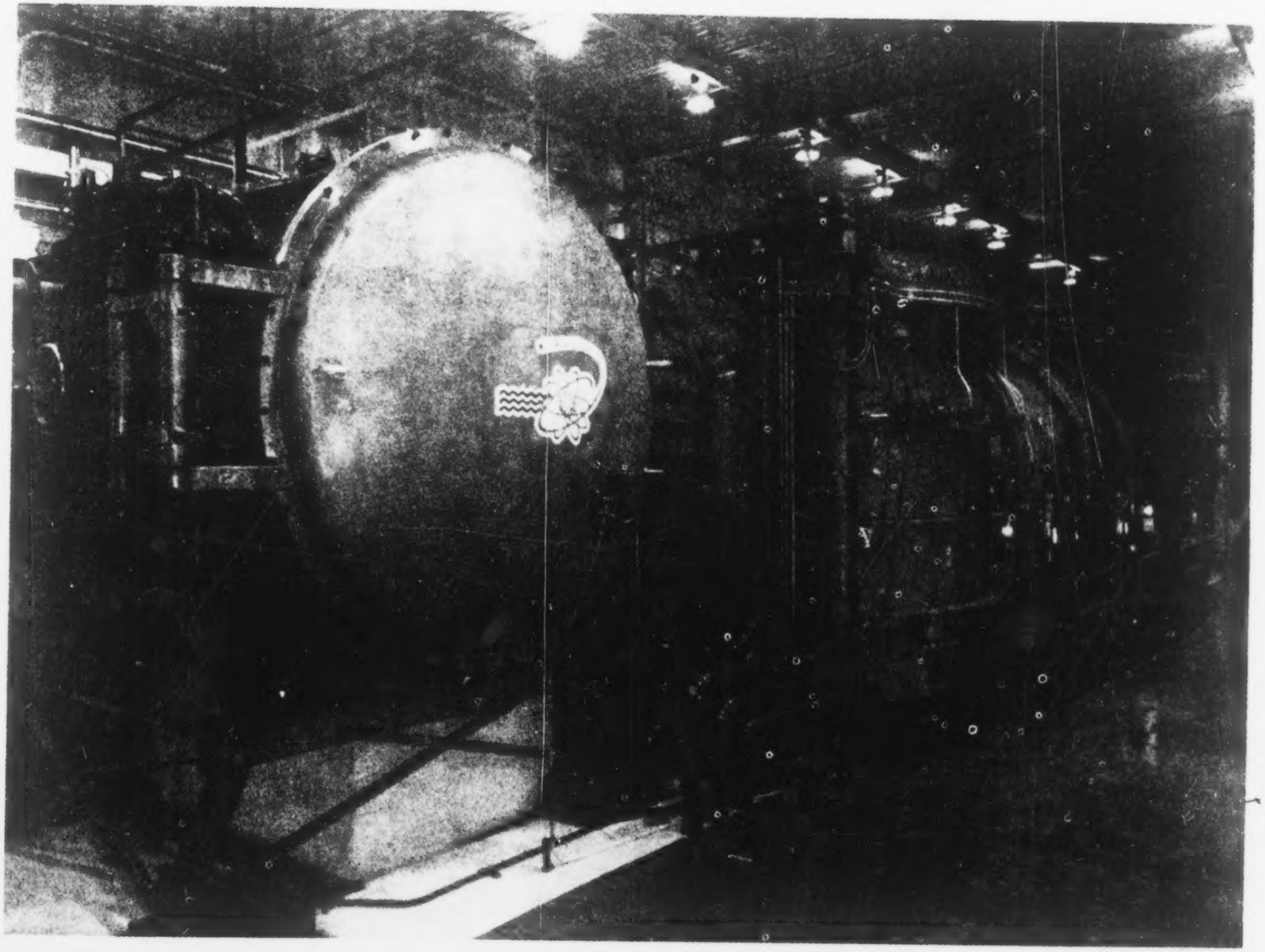


Figure 13

Major AVLIS accomplishments—Separator system

- Full-scale hardware testing has been under way in the Separator Demonstration Facility for 16 months
  - Activated and operated full-scale uranium vaporizer for more than 100 h
  - Vaporization tests have exceeded plant rates
  - Over 5 metric tonnes of uranium have been evaporated in a single test

- Full-scale liquid-flow testing in the Materials Handling Demonstration Module at Oak Ridge was successfully completed

- Functionally integrated operations continued in the half-scale Mars facility
  - Full assembly, vaporization, enrichment, and refurbishment operations
  - Full thermal and liquid-flow control demonstrated
  - Long-term enrichment performance demonstrated

Figure 14

3/5/87EIM-18D34

Major AVLIS Program accomplishments—Integrated enrichment

- Integrated demonstrations in half-scale separator have demonstrated:
  - Continuous, steady isotopic separation for >36 hours and 1% product assay
  - Near plant design vaporization rate and processing of 0.6 metric tonnes of uranium feed
  - Plant design laser illumination

- This demonstration is a 30-fold increase in enrichment performance this year

Figure 15

3/5/87EIM-7D34

AVLIS Program readiness

- The AVLIS Program is ready to move on to full-scale plant technology and engineering demonstrations
  - Full-scale facilities and special equipment in place
  - Highly motivated and talented teams at LLNL and MMES
  - Proven technology at significant scale
  - Operating capability in industrial environment
- Stability of purpose and funding is required to maintain our competitive edge

Figure 16

3/5/87EIM-12D34

Three AVLIS program planning options

Option	Plan	Funding (M$)				
		FY88	FY89	FY90	FY91	FY92
1	● President's budget — Close out AVLIS development program in FY88	0	0	0	0	0
2	● Technology Development and Demonstration (TD&D) program — Complete development to full-scale hardware by FY92 — Demonstrates plant cost projections are achievable	100	100	100	100	100
3	● TD&D program structured for FY96 AVLIS production start — Engineering demonstration establishes plant design readiness by FY93 — Confirms plant cost projections	100	135	165	165	135

Figure 17

3/6/87EM-1D34

Impact of FY88 AVLIS Program closeout

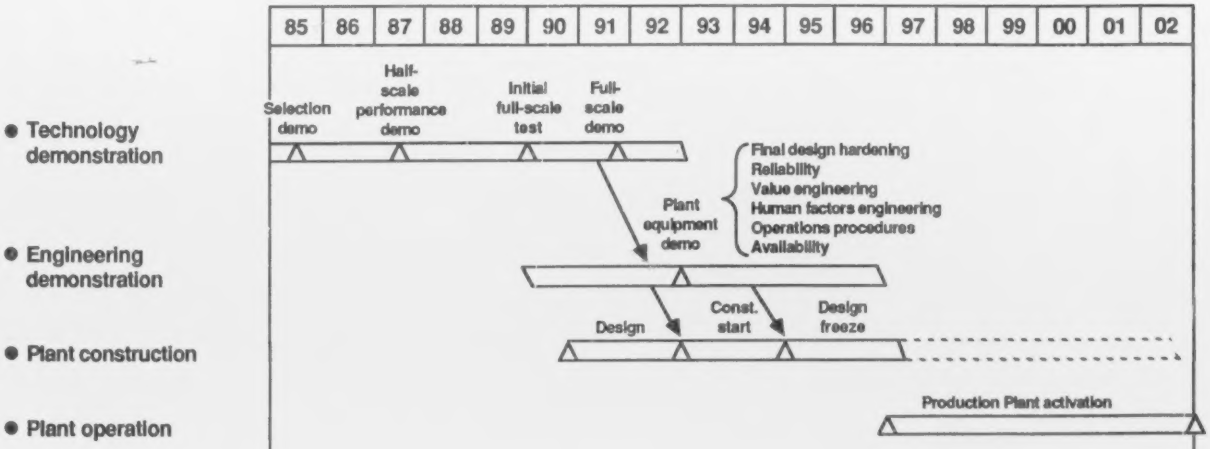
- The President's budget request for zero AVLIS funding in FY88 will
  - Irrevocably disperse experienced LLNL/MMES AVLIS staff
  - Shut down all of AVLIS facilities
  - Result in loss of AVLIS technology for the United States

- The effect of this action would be profoundly detrimental to the Enrichment Enterprise
  - Loss of long-term customers
  - Long-term dependency on foreign suppliers for nuclear fuel
  - Weakening of privatization option

Figure 18

3/5/87EIM-11D34

Recommended deployment plan-option 3



- Costs and production

	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	00	01	02
— Demonstration		84	79	100	135	165	165	135	100	52	36	33						
— Plant construction						3	12	22	85	90	135	190	235	235	210	160	80	10
— Plant operations											20	45	85	170	215	235	235	221
— Product (MSWU/y)													0.4	1.2	3.0	6.9	10.0	12.0

(All FY88 M$ except FY86 and FY87)

Figure 19

3/6/87JE-1D34

What is needed to deliver the promise of AVLIS?

- $100M in FY88 will hold open Options 2 and 3:
  - — Upgrade the Laser Demonstration Facility to significantly enhance enrichment testing capability
  - — Continue life and reliability improvements for laser-system components to within a factor of 2 of plant goals
  - — Optimize the design for uranium separators and continue tests
  - — Increase development of materials offering lower separator capital and operating costs

This course of action will allow the U.S. to remain competitive in uranium enrichment for decades to come

Figure 20

The AVLIS Program—A conundrum

- AVLIS technology, progress, and outlook are sound
- AVLIS is needed by the U.S.:
  - Foreign competitive pressure is increasing on uranium enrichment
  - Energy security and balance of trade require the U.S. to remain competitive
  - GDPs will become noncompetitive by 1995–2000

- Demonstration facilities and a team are in place and ready to deliver

. . . BUT . . .

- The past two budget requests have sought to eliminate or greatly reduce Uranium AVLIS development

We need some stability

Figure 21

3/5/87EIM-14D34

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March 27, 1987

The Honorable Wendell H. Ford
The United States Senate
SD-317, Dirksen Senate
  Office Building
Washington, D.C. 20510

Re: Uranium Mining Viability Hearings

Dear Senator Ford:

In their testimony before the Subcommittee on Energy Research and Development on March 9, 1987, Robert Luke, President of the Uranium Producers of America, and Nolan Hancock, on behalf of the Oil, Chemical and Atomic Workers International Union, made a number of allegations about supposed unfair trade practices on the part of the Canadian uranium industry. As counsel for four Saskatchewan uranium producers, we are submitting this letter to demonstrate that these allegations are without merit. We respectfully request that you include the letter in the written record of the hearings.

A. Canadian Government Ownership of Uranium Production Has Not Conferred a Subsidy

Mr. Luke claimed that government ownership of certain uranium production facilities in Canada confers an unfair subsidy upon Canadian uranium production. This allegation is not supported by the facts. Both Eldorado and SMDC have always operated as strictly commercial undertakings. Indeed, the Federal Government is making arrangements to sell its entire interest in Eldorado, and the Government of Saskatchewan is considering a public offering of a substantial portion of SMDC.

In any event, under the U.S. countervailing duty law, 19 U.S.C. § 1671 *et seq.*, government ownership *per se* does not constitute an unfair subsidy. Rather, government ownership -- through equity purchases or otherwise -- constitutes a subsidy only if the government investment was inconsistent with commercial considerations. See, e.g., Certain Steel Products from Belgium, 47 Fed. Reg. 39,304 (1982). If an industry is "equityworthy," and has an "ability to generate a reasonable rate of return within a reasonable period of time," no subsidy exists. See U.S. Department of Commerce, Subsidies Appendix 12 (1984). The soundness of any government investment is to be assessed "as of the time of the investment." Ibid.

Investments by Canadian federal and provincial governments in the Canadian uranium industry have been "consistent with commercial considerations." The $250 million investment by the Government of Saskatchewan in the Saskatchewan Mining Development Corporation (SMDC), for example, occurred during the second half of 1970's, when the uranium market was strong and its prospects exceptionally bright. That investment helped SMDC to secure an additional interest in and to develop the Key Lake deposit, which is among the richest and most valuable uranium deposits in the world. Moreover, SMDC has been a profitable company even during recent periods of depressed uranium prices, and is continuing to pay substantial dividends to the Government of Saskatchewan.

Similarly, the $300 million investment by the Canadian government in Eldorado in 1981 -- which took the form of a transfer to Eldorado of the government's uranium stockpile in exchange for stock -- was a sound commercial decision. Because of the general depression in the uranium market at the time, the stockpile represented an underutilized, near-dormant asset. Eldorado provided a mechanism for the government to realize a reasonable return on the asset, with the value of the asset being invested in several capital projects and in the acquisition of additional mining properties which have provided attractive returns to the company, and thus to the government. In addition, Eldorado is an historically profitable company that holds a substantial stake in some of the most valuable uranium deposits in Canada.

Another allegation by the U.S. industry is that the Government of Canada has "forgiven" a $100 million loan to a subsidiary of Eldorado. This allegation is simply incorrect. The loan -- which took the form of a transfer of uranium from the government's stockpile rather than cash -- was made on commercial terms and has been repaid with interest. Part of the loan was repaid in kind. The remainder, together with accrued interest, was taken into account in determining the consideration to be given to the Canadian Government in return for the transfer of the government's stockpile to Eldorado.

B. Long-Term Contracts with Canadian Provincial Government-Owned Utilities Do Not Establish the Existence of Dumping or Subsidies

Canadian uranium producers sell uranium to Canadian provincial government-owned utilities (principally, Ontario Hydro) through long-term contracts in which the prices paid often exceed current spot market prices. Mr. Luke claims that this is unfair. His concern appears to be that because the long-term prices charged in Canada by Canadian uranium producers are above the price for spot market sales by those same producers in the United States, such U.S. sales constitute "dumping." On other occasions, the U.S. industry has characterized the price differences as "subsidization" on the theory that the government-owned utilities are deliberately paying an inflated price for Canadian uranium. Both charges are without merit.

Because of the extraordinary price volatility and fear of supply shortages in the uranium market during the late 1970's, Canadian utilities -- like their counterparts throughout the world -- became concerned about the security of their uranium supplies. To reduce the uncertainty of future price increases and ensure continuity of supply, the Canadian utilities entered into long-term supply contracts.

The price negotiated in these contracts, though higher than the current spot price of uranium, were reasonable, arm's-length prices at the time of the contract negotiations. The fact that uranium prices have since declined drastically in no way implies that the long-term contract prices negotiated in the past constitute a subsidy. Indeed, many U.S. uranium producers also benefit from long-term contract prices that considerably exceed current spot prices. No one would seriously contend, however, that U.S. producers are subsidized by those long-term contracts.

Moreover, the long-term contracts at issue in Canada are for the most part contracts with Ontario Hydro. The principal beneficiaries of these contracts -- Rio Algom and Denison -- are not active participants in the United States market. And, to the extent that Saskatchewan producers sell to Ontario Hydro, it is absurd to suggest that the Government of Ontario -- through Ontario Hydro -- would desire to "subsidize" Saskatchewan producers.

Equally clearly, sales at the current spot price in the United States do not constitute "dumping" merely because sales under long-term contracts in Canada are made at higher prices. Under the U.S. antidumping laws, prices under long-term contracts simply cannot be compared with current spot prices. See Freeport Minerals Co. v. United States, 590 F. Supp. 1246 (Ct. Int'l Trade 1984), reversed on other grounds, 776 F.2d 1029 (C.A.F.C. 1985). The prices of the long-term contracts were in line with market conditions at the time. And current spot sales to Canadian customers and for export to third countries are at the same prices as contemporaneous spot sales to the United States.

C. The Canadian Government Does Not Allocate Market Shares

Mr. Luke's claim that the Canadian Government requires Canadian nuclear utilities to buy 100 percent Canadian uranium is incorrect. In the past, when uranium was in short supply, Canadian utilities were encouraged by the government to contract forward for a 15-year supply, but there was no requirement as to the source of the uranium. Canadian utilities were free to buy uranium from any country they wished. In any event, even the encouragement of forward contracting has ceased since 1983.

Conclusion

As Dr. Rossin of the Department of Energy testified before your subcommittee, the difficulties of the industry have been caused not by imports, but by reduced demand for uranium, the low grade of the domestic ore, and excessive inventories. The domestic uranium industry's allegations that Canadian producers have engaged in unfair trade practices are a mere smokescreen designed to disguise the industry's real problems.

Respectfully submitted,

Patrick Macrory.

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